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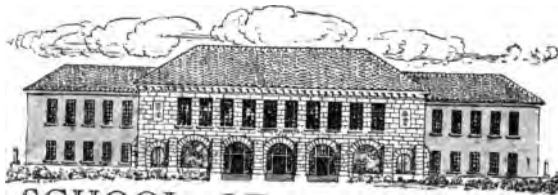


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A School Building Program For Cities

By N. L. Engelhardt, Ph.D.

TEACHERS COLLEGE, COLUMBIA UNIVERSITY
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N. L. E.

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INTRODUCTION

That the city planning movement in this country is of comparative recency may be judged from the available literature on this subject. Of six hundred titles relating to city planning and allied subjects appearing in a list compiled in 1913 by the New York Public Library, the large majority were first issued within the present century. (Of these six hundred titles, none concerns itself completely or in large part with the problems connected with the outlining of school building programs.)

A broader concept of what a city should be has gradually been dawning on the American people. A city is now conceived as a corporation working for the common good in a businesslike way. This implies adapting for city development the methods employed by the successful commercial and industrial corporations of the country. Part of the program followed by such organizations has been the study of the future needs of the people they expect to serve, as well as an attempt to discover the increase in growth of population in the communities in which they are doing business. The business corporation serving a widely scattered public which does not build in terms of the future development of the territory which it serves soon fails to make adequate dividend returns to its stockholders.

The development of the school systems of the majority of American cities has suffered much from a lack of continuity in plan or program. Only recently has the practice been pursued of placing the control and responsibility of management of school systems in the hands of professionally trained executives. Where the responsibility for the progress of school systems or the building of a school plant has been vested in lay boards of education, whose interest in educational matters has been secondary and temporary, one may not expect to find school plants which are wisely planned, adequately housed, and economically maintained. The pernicious policy of appointing superintendents of schools for a term of one year or two years that still prevails in many cities destroys all possibility of a consecutive building program. Such a program involves the

adoption of standards, absolute and comparative measurement, and the recognition of future as well as present needs. Complete analyses of school plants in various cities have demonstrated the universal need for periodic inventories or surveys.

A part of the findings reported in this work is the result of the writer's personal participation in six extensive school building surveys. The communities surveyed varied from the small New York suburban community of Great Neck, Long Island, to St. Paul, a city of 250,000 people. Omaha, Neb., Paterson, N. J., Framingham, Mass., and Pelham, N. Y., were also included in the list. These surveys have been drawn upon for much of the illustrative material.

The development of a school building program involves three distinct problems in measurement: First, the measurement of population, second, the measurement of the school plant, and third, the measurement of the ability of a community to pay for needed extensions to its school plant.

Under the Measurement of Population have been treated such essentials as the growth in American cities, the relationship between adult and school population, the methods of measuring population growth, and some of the methods that may be employed in measuring school population. With the latter is coupled the consideration of elements essential in the locating of school buildings.

Under the Measurement of the School Plant some of the possibilities of measurement of a school plant with and without the aid of a building score card are presented.

Part III has been devoted to the measurement of the ability of a community to pay for school plant extensions. Financial tabulations have been provided which will assist a superintendent of schools in his presentation of arguments for additional school funds. Discussions on types of bond issues, the prevailing rates of interest on school bonds, and the present indebtedness of communities incurred in the extension of school plants, are also embodied in this section.

Throughout this study it has been the aim of the writer to suggest and perfect ways and means of measurement which may be utilized by superintendents of school systems in the development of their school building programs. For the elevation of the profession of school superintendent much in the way of standardization

and scientific procedure remains to be done. Past failures in accepting standards and adopting businesslike methods have proven disastrous financially as well as educationally. With constantly mounting costs in school maintenance, as well as in school building construction, the need for economy in planning and for systematic rather than haphazard development of a school building program is for the first time becoming apparent to many local educational authorities. If this study assists in the solution of important problems connected with this development, the aims of the writer will have been achieved.

PART I

STUDIES IN POPULATION

I. THE MEASUREMENT OF POPULATION

The need for school building programs becomes evident only as cities grow. That growth is not identical in all cities, nor developing at any uniform rate, is quite certain. That growth in individual cities and sections of cities can be predicted with the assurance of a reasonable degree of reliability has been proved by the success achieved by many of our public service corporations. It has been apparent to the writer that all too frequently cities have been saddled with school plants expensive in their maintenance and even in original construction because of the lack of any population prognosis in the development of the plant. It is quite evident that a similar omission on the part of large private corporations might result in financial disaster.

A close study of the growth of American cities brings to light three distinct types which may be classified as follows: First, those that are static or retrogressive as to their growth; second, those that are exceptionally rapid in growth and have not as yet settled down to what might be termed a normal pace; third, those whose growth has a fair degree of regularity and may hence be classified as normal.

Inspection of Table I will show only eight cities of the 1890-1900 decade and only three cities of the 1900-1910 decade falling into the first group. Cities of this type may have passed through an unnatural boom period. Others may have depended for their growth upon a supposedly unlimited supply of natural resources which has suddenly become exhausted. In some instances, a promising industrial development has collapsed because of the lack of market, while in other cases remoteness from the more recently developed highways of travel has prevented either a mercantile or an industrial growth.

In the second group may be classed those cities in which predictions concerning growth have been surpassed. It may be also

evident in the cases of such cities that no reliable predictions for future development can be made. Cities which have been developing normally may receive an unexpected impetus and thus be thrown into this group. That relatively few cities have in the past two decades had great variations in their rate of growth may be seen from Table II. Cities which may be used as illustrations of extraordinary growth are Birmingham, Ala., Los Angeles, Cal., Flint, Mich., and Seattle, Wash., with percentages of increase of 245 per cent, 212 per cent, 194 per cent, and 194 per cent respectively. In such cases as these extraordinary measures must be taken to provide sufficient civic and educational advantages.

In the third category may be classed those cities in which a reasonably regular and clearly explicable growth has been made over

TABLE I

GROWTH OF POPULATION IN AMERICAN CITIES OVER THREE DECADES
GROUPED ACCORDING TO PERCENTAGES

Based upon the United States Census Figures of 1880, 1890, 1900, 1910

Percentages of growth during the decade	Number of cities which have grown according to percentages indicated from		
	1880-1890	1890-1900	1900-1910
0 and below		8	3
0 to 20	15	54	59
21 to 40	50	93	80
41 to 60	24	33	38
61 to 80	25	13	19
81 to 100	10	9	8
101 to 120	6	5	4
121 to 140	6		6
141 to 160	2	4	1
161 to 180	1	1	2
181 to 200	1	2	2
Over 200	17	2	6
<i>Total</i>	<i>157</i>	<i>224</i>	<i>229</i>
<i>Median (on finer distribution)</i>	<i>50.5</i>	<i>32.5</i>	<i>32.0</i>
<i>Range of middle 50 per cent</i>	<i>30.05-92.12</i>	<i>21.50-49.00</i>	<i>19.62-56.17</i>

a period of years. The large majority of cities will fall into this class.

In Table I are distributed the cities of the United States according to their percentages of growth during the three decades from 1880-1910.

It will be seen that the median growth for cities during the decades 1890-1900 and 1900-1910 has been approximately the same, or 32.5 per cent and 32 per cent respectively. During the decade 1880-1890 the median growth was somewhat larger, namely, 50.5 per cent. During the decade 1900-1910, the middle 50 per cent of the 229 cities included in the study ranged in growth from 19.62 per cent to 56.17 per cent. Only 21 cities, or 9 per cent of the total number of cities involved, had a growth of more than 100 per cent in 1910 over the census figures of 1900. Evidently growth in the majority of American cities is taking place at no phenomenal rate. The forces instrumental in producing such growth, since

TABLE II

VARIATION IN THE PERCENTAGE OF GROWTH IN THE 226 LARGEST CITIES
IN THE UNITED STATES. PERCENTAGES OF GROWTH, 1890-1900
AND 1900-1910 COMPARED

<i>Differences in the percentages in growth of 1890-1900 and 1900-1910</i>	<i>Number of cities having such differences</i>	<i>Percentage of cities having such differences</i>
0-10	90	39
11-20	40	18
21-30	30	13
31-40	16	8
41-50	15	7
51-60	6	3
61-70	5	2
71-80	1	1
81-90	2	1
91-100	2	1
Over 100	19	7
<i>Total</i>	<i>226</i>	
<i>Median</i>	<i>15 1/4%</i>	
<i>75 percentile</i>	<i>37%</i>	

they act over long periods, may be studied and the developing needs anticipated and provided for.

That there is uniformity in the development of communities after they have passed through what might be termed their period of initial boom, may be seen from Table II. School authorities will have little difficulty in adjusting their building programs where

TABLE III
POPULATION GROWTH OF THE CITY OF ROCHESTER, N. Y. ON
VARIOUS CENSUS BASES
1830-1917

<i>Year</i>	<i>United States census</i>	<i>Federal estimates</i>	<i>City directory</i>	<i>State census</i>
1830	9,207			
1840	20,191			
1850	36,403			
1860	48,204			
1870	62,386		24,644	62,424
1875				81,673
1880	89,366		34,355	
1890	133,896		57,046	144,834
1900	162,608		74,262	
1905				181,666
1910	218,149		106,121	
1911		225,577	110,038	
1912		230,967	112,667	
1913		235,000		
1914		241,000		
1915		249,067		248,465
1916		258,000		
1917		260,000		

✓ differences of less than 25 per cent appear in the course of a decade. Table II gives the variations in the percentages of growth between the two decades 1890-1900 and 1900-1910 for 226 cities. The median city of the group had a difference of percentages for the two periods of $15\frac{1}{4}$ per cent. Of the 226 cities, 39 per cent had a change in percentage of growth in 1900-1910 of 10 per cent, or less, over the percentage indicated for the previous decade. Seventy-five per cent of the cities had a change of percentage of 37 per cent, or less,

for the same two decades. It appears from these tables that increase of population in the majority of American cities permits of forecast with a fair degree of reliability.

In measuring the increase of population in any one city, a distribution of the figures for total population over a reasonably long period of years, as shown in Table III, may be considered the first essential. This table gives figures for the past eighty-seven years for the city of Rochester, N. Y. It includes the figures obtained by each decennial census during these eighty-seven years, the figures reported at certain five-year periods by the official state census, as well as figures reported in the official city directory. It may be

TABLE IV

GROWTH OF POPULATION OF THE TOWN OF FRAMINGHAM, MASS.

		<i>Increase</i>	<i>Percentage of growth over preceding date</i>
1895	9,512		
1900	11,302	1,790	19
1905	11,549	247	11
1910	12,984	1,435	9
1915	15,860	2,876	22

possible in some instances to secure census figures from other sources which will also provide a check on accuracy. The post-office authorities, as well as private agencies such as telephone companies, street-car companies, and others, are concerned with matters of census, and frequently compile their own statistics. That different agencies are responsible for the compilations in Table III assures a check which would not exist if the data furnished by only one of the agencies were considered. All figures listed under Federal Estimates were obtained according to the methods employed by the census authorities. [A tenth of the increase of the preceding decade, as recorded by the census, is the uniform estimate of increase for each year of a passing decade.]

The problem of measurement of population which school authorities are required to face may be expressed best in terms of increase in population as in Table IV, taken from the Framingham, Mass.,

survey of 1917.¹ In such a table the middle column, giving increases in growth over each preceding period, becomes a significant measure of the need for school building extension.

Growth in population may be shown by giving the increase over a decade in terms of the number of newcomers added per day, per week, or per month. This is done by Dr. Cubberley in the Salt Lake City survey of 1915,² where it is shown that the average increase over the entire ten years from 1900-1910 was equal to 11.2 persons per day. The rate toward the latter part of the decade, it is stated, must have been as high as 15 persons per day.

In the survey of the community of Great Neck,³ a suburb of New York City, it was considered advisable to use as evidence of regular increases in population the percentage of increase in the number of commuters passing to and from Great Neck to New York City. The facts for the two years 1911 and 1916, distributed by months, as given in Table V are indeed significant.

TABLE V

INCREASE IN THE NUMBER OF COMMUTERS FROM GREAT NECK STATION
TO NEW YORK CITY, 1911-1916

	1911	1916	Increase	Per cent increase
January	126	269	143	113
February	132	263	131	99
March	127	263	136	108
April	138	261	123	90
May	151	296	145	91
June	146	305	159	109
July	139	297	158	114
August	140	292	152	109
September	140	281	141	101
October	152	312	160	105
November	140	286	146	104
December	140	299	159	114
Totals	1,671	3,424	1,753	105

¹ Strayer, *et al.*, *Framingham, Mass., Survey*, 1917.

² Cubberley, *School Organization and Administration*, World Book Company, Yonkers, N. Y.

³ Strayer and Neale, *Great Neck Survey*, Great Neck Association, Great Neck, L. I.

The increase or falling off in the number of dwelling building permits issued over a period of years may be considered another good index of tendencies in growth of a city. In Table VI will be found the distribution of dwelling building permits issued in the city of St. Paul for the period 1910-1916.

In Volume I⁴ of the 1910 United States Census the number of persons per dwelling in St. Paul is given as 6.3 in 1890, 6.6 in 1900, and 6.6 in 1910. Since no difference appears in the numbers as given for 1900 and 1910, it may be considered reasonable to assume

TABLE VI
DISTRIBUTION OF DWELLING BUILDING PERMITS ISSUED IN THE CITY
OF ST. PAUL, 1910-1916

	1910	1911	1912	1913	1914	1915	1916
Dwelling building permits issued	1,416	1,265	1,237	1,308	1,306	1,379	1,275
Estimated number of persons provided for in such new dwellings	9,345	8,349	8,164	8,633	8,620	9,101	8,415

that the average number for the years 1911-1916 does not vary greatly from the 6.6 of the previous decade. Using this as the constant multiplier for the first line of Table VI, the number of persons for whom these dwellings would be provided would be approximately as shown in the table. In any use made of this table, other facts affecting the validity of these data as a measure of growth, such as the number of dwellings destroyed or removed, must be given due consideration.

Table VII brings in the element of the land additions that have been made to the territory which a city covers. The unit used in this table, the population density per square mile, becomes an especially desirable measure where no changes have been made in a city's territory over a period of years. The composition of population, changes in composition over an extended period, changes in the number of persons per family and in the number of persons per dwelling, are further elements which may throw light on population tendencies.

⁴ p. 1,289.

Table VIII shows the situation in the United States as regards the distribution of native whites, foreign born whites, and negroes in all cities over 25,000, census of 1910.⁵ The large percentage of foreign born whites, which no doubt will be augmented considerably after the World War, has a direct bearing upon a building program. It emphasizes the need for buildings which are not only properly equipped for academic work for the child and for social and recre-

TABLE VII

POPULATION DENSITY PER SQUARE MILE, ST. PAUL, MINN., 1850-1916

<i>Year</i>	<i>Square miles</i>	<i>Year</i>	<i>Popula- tion</i>	<i>Year</i>	<i>Density per square mile</i>
1847 Town site laid out	.14				
1849	.35	1850	1,112	1850	3,177
1854	3.75	1860	10,401	1860	2,773
1868	5.45	1870	20,030	1870	2,005
1873	15.56	1880	41,473	1885	2,028
1885	35.34	1890	113,156		
1887	55.44	1900	163,065	1900	2,941
		1910	214,744	1910	3,873
1916 Present area	55.44	1916 ⁶	250,000	1916 ⁶	4,509

ational opportunities for both child and adult, but also for the academic development of the adult.

A detailed study of composition of population in any one city should involve a percentile distribution of the various elements of population showing changes for three or four decades and comparison for those same periods with tendencies in all other cities of the same class group. In this way it may be ascertained whether the individual situation differs from that of the nation or of the specially selected group with which comparisons seemed advisable.

In measuring population with the use of the number of persons per family or per dwelling as a unit, the change that has taken place in this unit over the period involved must be borne in mind. Table

⁵ Distribution made from *Thirteenth Census of the United States, 1910, Vol. I.*

⁶ Estimated.

IX shows what this change has been for the United States as a whole during the period 1890-1910. The median cities of the '100,000 and over' and of the 25,000-100,000 classes in respect to size of families were in 1910 cities whose averages for family groups were 4.64 and 4.5 persons respectively. Table IX points out the gradual dropping of the median in cities of the United States for the past three decades on this item.

TABLE VIII

NUMBER OF CITIES HAVING VARIOUS PERCENTAGES OF TOTAL POPULATION

Per cent	Native White				Foreign-born white		Negroes	
	Of native parentage		Of foreign or mixed parentage					
	Cities over 100,000	25,000-100,000	Cities over 100,000	25,000-100,000	Cities over 100,000	25,000-100,000	Cities over 100,000	25,000-100,000
0-5			1	11	5	28	37	130
6-10			4	18	6	23	5	11
11-15	1	3	1	8	2	20	1	
16-20	3	11	3	17	7	28	2	
21-25	6	6	6	19	7	18		
26-30	10	14	3	27	8	23	2	
31-35	3	23	5	32	8	19	2	
36-40	4	14	20	29	5	11	3	
41-45	8	18	6	13	2	7		
46-50	6	12	1	5		1		
51-55	4	25		1		4		
56-60	1	14						
61-65	4	13						
66-70		5						
71-75		12						
76-80		4						
81-85		1						
86-90		3						
Total	50	178	50	180	50	182	52	141
Median percentage	37.5	45.5	36.5	29.8	25.5	19.3	2.7	0.7

Census, 1910

Comparative Statistics

With the determination of the tendencies in growth over certain periods in a city is closely connected the question of whether the rate of growth has any relationship to the rate shown to exist in other cities which are struggling with similar problems, whether of a geographical, social, economic, or industrial nature. In many of the school surveys which have come from the press during recent years, a statistical comparison of the growth in population between the city under immediate consideration and a group of selected cities has been made. In the survey of Salt Lake City made in 1916,

TABLE IX
NUMBER OF PERSONS TO A FAMILY AND TO A DWELLING, CITIES OF
25,000 AND OVER, 1890-1910 ⁷

	<i>Cities 100,000 and over</i>			<i>Cities 25,000-100,000</i>		
Number of persons to a family	<i>1890</i>	<i>1900</i>	<i>1910</i>	<i>1890</i>	<i>1900</i>	<i>1910</i>
Median city	4.97	4.69	4.64	4.85	4.60	4.50
Number of persons to a dwelling	<i>1890</i>	<i>1900</i>	<i>1910</i>	<i>1890</i>	<i>1900</i>	<i>1910</i>
Median city	6.29	6.05	4.89	5.23	5.29	5.22

Dr. Cubberley selected for purposes of comparison "every northern and western city which in 1910 had between 75,000 and 125,000 inhabitants, and which had increased in population during the previous decade." Salt Lake City was thus shown by this table to have exceeded in rate of growth twenty-two of the twenty-five other cities of the tabulation. Strayer and Engelhardt in the St. Paul survey of 1917 selected as the group which would afford the basis for comparative study "the twelve northern and western cities that were just greater than St. Paul in population and the twelve northern and western cities that were just below St. Paul in population." Dr. Van Sickle in the Brookline, Mass., survey made in 1917 selected two different groups of cities for purposes of comparison. The first group was "composed of all the fifty-one cities in the United States, including Brookline, which had a population in 1910

⁷ Calculations made from data on pp. 1,287 ff., *Thirteenth Census of the United States*, Vol. I.

of 25,000 or over, and less than 31,000, Brookline being the twenty-fifth city in point of size in the list. This first group was to furnish a general measure, nation wide, with which Brookline is most closely comparable. . . The second group was composed of the cities most like Brookline as regards wealth, intelligence, proximity to urban centers, number of commercial and industrial estab-

TABLE X
POPULATION OF CERTAIN CITIES USED FOR COMPARISON IN THE
BROOKLINE SURVEY, 1850-1910

	1850	1860	1870	1880	1890	1900	1910
Springfield, Mass.	11,766	15,199	26,703	33,340	44,179	62,059	88,926
Yonkers, N. Y.				18,892	32,033	47,931	79,803
Berkeley, Cal.					5,101	13,214	40,434
Newton, Mass.	5,258	8,382	12,825	16,995	24,379	33,587	39,806
San Diego, Cal.		731	2,300	2,637	16,159	17,700	39,578
East Orange, N. J.						21,506	34,371
Pasadena, Cal.					4,882	9,117	30,291
Colorado Springs				4,226	11,140	21,085	29,078
New Rochelle, N. Y.	2,458	3,519	3,915	5,276	9,057	14,720	28,867
Brookline, Mass.	2,516	5,164	6,650	8,057	12,103	19,935	27,792
Madison, Wis.	1,525	6,611	9,176	10,324	13,426	19,164	25,531
Evanston, Ill.						19,259	24,978
Montclair, N. J.						13,962	21,550
Oak Park, Ill.							19,444
White Plains, N. Y.					4,042	7,899	15,949
Milton, Mass.					4,278	6,578	7,924
Wellesley, Mass.					3,600	5,072	5,413

lishments, and the reputation of its schools. This group provides a comparative measure for Brookline which is superior to the former group in that cities contained in it are of more nearly identical condition."

Table X shows the population figures for the second group of cities used in the Brookline comparisons. Fig. 1 represents this table graphically.

An inspection of Fig. 1 will show that although the cities selected may resemble Brookline in the particulars above named, the problems connected with increases in population, and hence with the school building program, have during the past sixty years been

very unlike those of Brookline in many cases. For instance, the problems found to exist in Milton, Wellesley, Evanston, and Madison would not be the problems of the cities of Springfield and Yonkers, which have grown with great rapidity.

Table XI and Fig. 2 represent a similar study for the cities utilized in developing the building survey of St. Paul in 1917. From

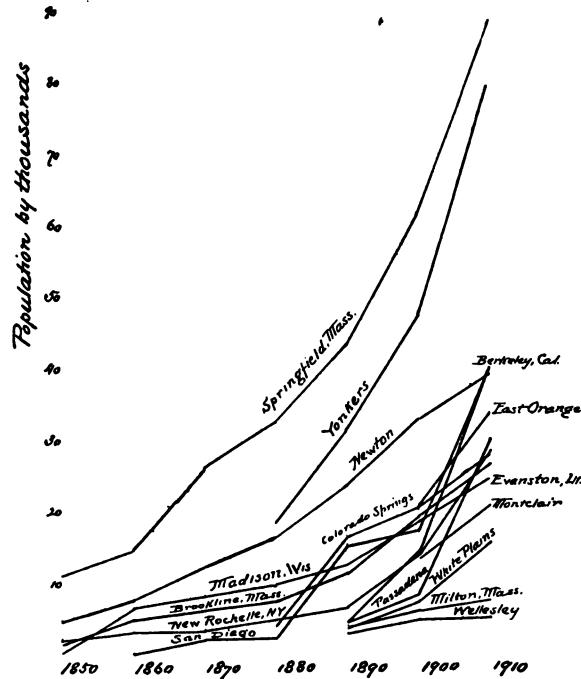


FIG. 1

the graph it is clear that a better selective process might be employed where comparisons between cities are desired.

Table XII indicates rather clearly that in the selection of cities from the '500,000 and above' group, the cities of Cleveland, Detroit, Minneapolis, Pittsburgh, and Newark form a more suitable combination than the entire ten cities included in Table XII. The average deviations obtained from a consideration of the first five cities mentioned are in every case less than the figures secured from a consideration of the ten cities.

Since the increments in population for these five cities also emphasize the similarity existing between them, it appears that a maximum of fairness has been secured for the purpose of comparison. No doubt only a slight effort would be necessary to secure on

TABLE XI
POPULATION OF CITIES USED FOR COMPARISON IN THE ST. PAUL SURVEY, 1917

<i>Years</i>	1850	1860	1870	1880	1890	1900	1910
Cincinnati	115,435	161,044	216,239	255,139	296,908	325,902	363,591
Newark	38,894	71,941	105,059	136,508	181,830	246,070	347,469
Washington	40,001	61,122	109,199	177,624	230,392	278,718	331,069
Minneapolis		2,564	13,066	46,887	164,738	202,718	301,408
Seattle			1,107	3,533	42,837	80,671	237,194
Jersey City	6,856	29,226	82,546	120,722	163,003	206,433	267,779
Kansas City, Mo.		4,418	32,260	55,785	132,716	163,752	248,381
Indianapolis	8,091	18,611	48,244	75,056	105,436	169,164	233,650
Portland, Ore.		2,874	8,293	17,577	46,385	90,426	207,214
Denver			4,759	35,629	106,713	133,859	213,381
Rochester	36,403	48,204	62,386	89,366	133,896	162,608	218,149
St. Paul	1,112	10,401	20,030	41,473	133,156	163,065	214,744
Columbus	17,882	18,554	31,274	51,647	88,150	125,560	181,511
Oakland		1,543	10,500	34,555	48,682	66,960	150,174
Toledo	3,829	13,768	31,584	50,137	81,434	131,822	168,497
Worcester	17,049	24,960	41,105	58,291	84,655	118,421	145,986
Syracuse	22,271	28,119	43,051	51,792	88,143	108,374	137,249
New Haven	20,345 ^a	39,267 ^a	50,840 ^a	62,882 ^a	81,298	108,027	133,605
Scranton		9,233	35,092	45,850	75,215	102,026	129,867
Spokane					19,922	36,848	104,402
Paterson		19,586	33,579	51,031	78,347	105,171	125,600
Omaha		1,883	16,083	30,518	140,452	102,555	124,096
Fall River	11,524	14,026	26,766	48,961	74,398	104,863	119,295
Grand Rapids	2,686	8,085	16,507	32,016	60,278	87,565	112,571

these bases the companion cities for any city that was being subjected to a critical study.

Cities selected on the basis of geographical location or of approximately equal size at a stated interval will, it is apparent, not furnish the best comparisons when considerations involve a school building program. Such cities, it may be pointed out, have many points of similarity in common, and furnish a larger group than would be available under a greater refinement of selection. It would seem

^a Population of town; town and city not returned separately.

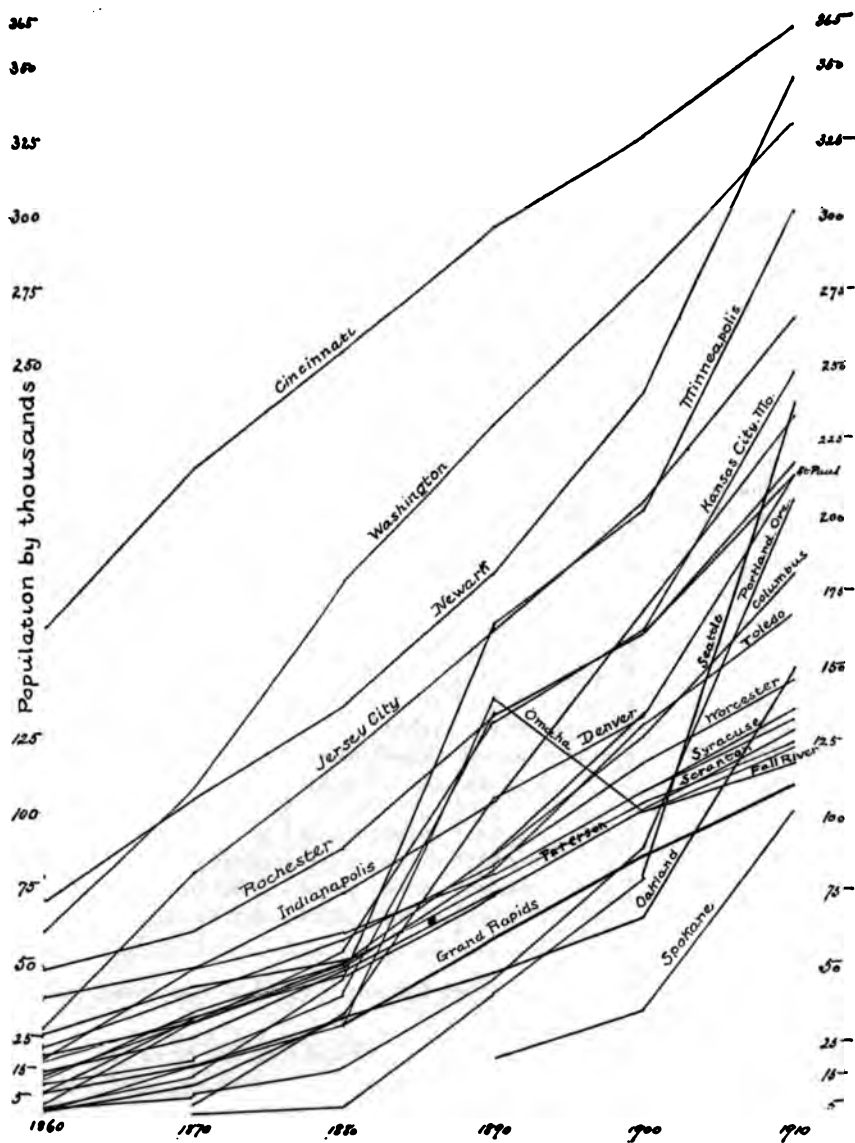


FIG. 2

Showing the growth in population of the cities
listed in Table XI

TABLE XII
THE SELECTION OF CITIES FOR COMPARATIVE PURPOSES ON THE BASIS OF COMPOSITION OF POPULATION

City	1910				1900				1890			
	Native white		Foreign born white	Negro	Native white		Foreign born white	Negro	Native white		Foreign born white	Negro
	Native percentage	Foreign or mixed percentage			Native percentage	Foreign mixed percentage			Native percentage	Foreign or mixed percentage		
Cleveland	23.6	39.9	34.9	1.5	23	42.8	32.6	1.6	23.6	38.2	37.1	1.1
Detroit	24.7	40.4	33.6	1.2	21.5	43.5	33.6	1.4	20.8	38.2	39.3	1.7
Minneapolis	31.9	38.7	28.5	.9	30.2	38.9	30.1	.8	32.7	29.7	36.7	.8
Pittsburgh	33	35.9	26.3	4.8	32.6	37.4	25.4	4.5	31	37.1	28.9	3
Newark	27.3	38.1	31.8	2.7	29.1	39.2	28.9	2.7	30.7	36.5	30.5	2.3
Average	28.1	38.6	31	2.2	27.3	40.4	30.1	2.2	27.8	35.9	34.5	1.8
Average deviation	3.5	1.3	2.9	1.2	4.+	2.2+	2.4	1.1	4.4+	2.5	3.8	.7
Milwaukee	21.1	48.8	29.8	.3	17	51.5	31.2	.3	13.3	47.6	38.9	.2
Los Angeles	53.2	23.4	19.0	2.4	52.8	25.5	17.5	2.1	49.2	23	21.5	2.5
Cincinnati	42.6	36.4	15.6	5.4	34.9	42.9	17.8	4.4	27.1	45.0	24	3.9
San Francisco	27.7	36.9	31.4	.4	24.4	40.1	30.4	.5	20.8	35.8	33.9	.6
Buffalo	28.2	43.3	28	.4	25.8	44.2	29.5	.5	22.2	42.5	34.9	.4
Average (10)	31.3	38.2	27.9	2	29.1	40.6	27.7	1.9	27.1	37.4	32.6	1.7
Average deviation	7.1	4.4	4.6	1.5	6.8	4.4	4.5	1.2	7	4.9+	5.1-	1.0+

wise, however, to make a second comparison when the problems of a school building program were being brought to light, on the basis of approximate equality of numbers of persons added to the population from decade to decade.

Figs. 3 and 4 show groups of cities selected on the basis of this approximate equality in growth over extended periods. The building programs of each of the groups as they have segregated themselves in the figures may have problems which will have many points in common. There is no doubt that the building problems of the one group of each of these figures are not identical with those of the other group, which has not been progressing in population at the same rate.

It may be necessary for purposes of comparison to choose cities which have similar problems as evidenced by the proportion of inhabitants of native origin, of mixed origin, and of foreign origin. The tendency in city surveys has been merely to point out the relationship existing in composition of population in cities selected on other bases, but not to use the likenesses in composition as the basis for selection. It is conceivable that the group suggested in Table XII, on the basis of composition of population, might furnish the most significant comparative data. Similar composition may signify similar needs in equipment as well as similar ability to pay.

Three other measures of population which at times may be of extreme importance in a campaign for developing a school building program have received very little recognition in the available literature on this subject. These measures are:

1. The percentage of males.
2. The percentage of married males.
3. The percentage of homes owned as contrasted with the percentage rented.

Dr. Cubberley points out in the Portland survey the preponderance of males and unmarried people as compared with the thirty-seven other cities which he used in his comparisons. With the number of elementary school children forming a low percentage, of the total population it was pointed out that Portland was in a position to provide any reasonable equipment for its schools.

The earning capacity of the male in the United States is on the average higher than that of the female. It will be admitted, there-

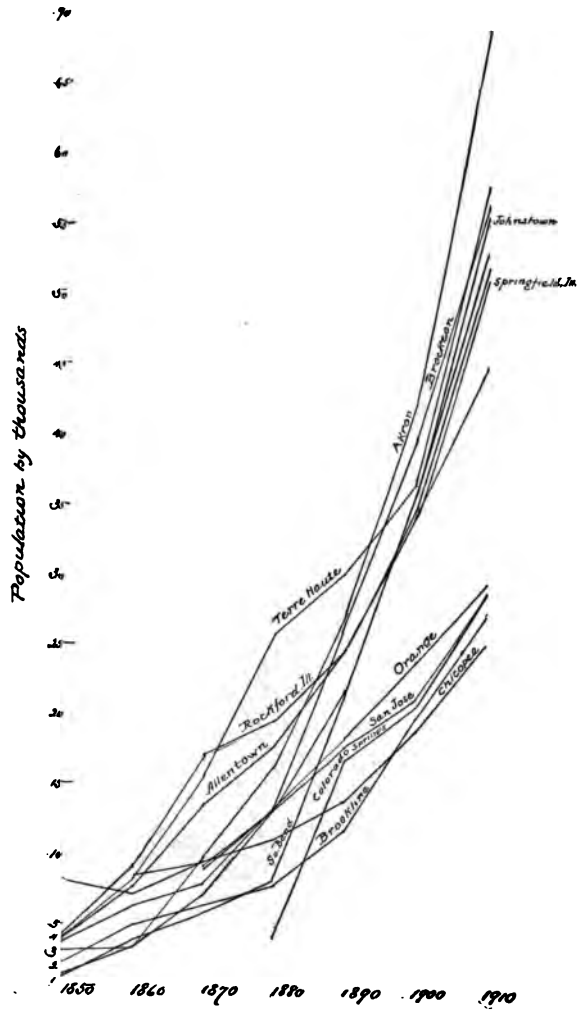


FIG. 3

Two groups of cities in each of which the school building programs of a period of years have required consideration involving approximately equal additions to population

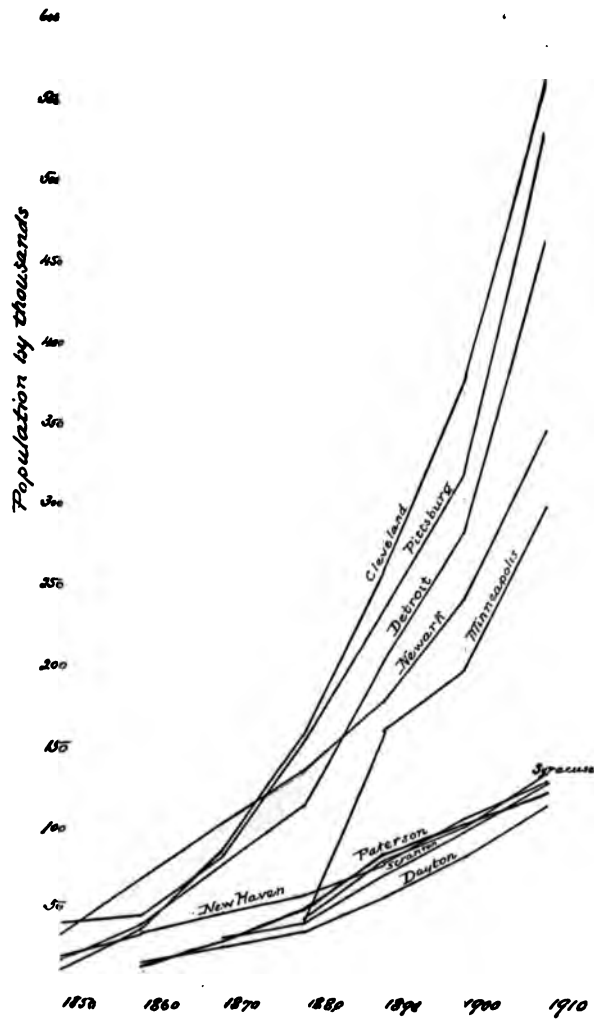


FIG. 4

Showing two groups of cities selected for comparison on the basis of approximate equality in growth over a period of years

fore, that in cities which have a great preponderance of males the problems of financing public enterprises are considerably lessened. Cities which have ratios of 130 to 138 males to 100 females have, no doubt, other things being equal, relatively simpler problems of financing than those cities which show ratios of 80 to 90 males for each 100 females.

Two measures closely related to percentage of males are the percentage of married males and the percentage of homes owned as opposed to those rented by their tenants. Communities with large percentages of encumbered homes have, it is to be expected, relatively greater difficulties in increasing the city tax burdens than more fortunate communities. Cities with large percentages of rented homes may also be conceived as having developed to a very slight degree the spirit of financial sacrifice for the common good. The inference may also be made that lower social groups, and hence those groups least awakened to educational needs, made up large percentages of the population where a majority of the homes is merely rented.

2. THE MEASUREMENT OF SCHOOL POPULATION

In 1917 all but one state of the United States had enacted compulsory education laws fixing the age limits for the attendance of all children in school. These age limits varied from eight to twelve years in North Carolina to seven to sixteen years in several states, with special provisions or exemptions in the latter cases for children between the ages of fourteen and sixteen.

The authorities responsible for the enforcement of the law vary. In Connecticut,⁹ political officials appoint truant officers; in Idaho, the probate courts, though in the large majority of states boards of education or equivalent bodies are charged with the selection of truant officers, and thus directly with the enforcement of the attendance law. It is presumably the intention of the law in all cases where it is not otherwise specified, to hold boards and officers charged with the enforcement of these laws responsible for the attendance at school during the legal age limits of all children residing within the respective communities, regardless of the type of school which they may attend or may prefer to attend. In other words, educational or other authorities obligated to enforce the

⁹ Bulletin No. 47, 1915, United States Bureau of Education, pp. 527 ff.

law are concerned with the school attendance of all children, whether attending public, private, or parochial schools, or having instruction in the home.

Authorities responsible for the establishment of building programs, or any extension of the school plant, are therefore required to think in terms of the entire number of school children for whom it might be necessary to make provision at any time included within the scope of the building program. Any policy which might suggest a less comprehensive program is self-condemnatory.

It has been pointed out in such school surveys as those of Butte, Montana, Salt Lake City, Utah, St. Paul, Minnesota, and others, that the most satisfactory plan to be employed for the purpose of securing the enforcement of the compulsory attendance law is the installation of a permanent school census system. The apparent inaccuracy of many of the school census reports sent yearly to the United States Commissioner of Education emphasizes the need for such service in all of our cities. In New York and Detroit it may be pointed out that after such systems had been put into operation 26,836 and 8,660 children respectively are reported to have been added to the school enrollment. In other words, in New York City after the permanent census system was installed, it became necessary for the school authorities to think in terms of school housing for an additional group of 26,836 children.

Directly issuing from this responsibility for providing educational facilities for all children appear such questions as these:

✓ What is the range of percentile relationships, as found in American cities, between entire population and the school census population? As cities grow in population can it be expected that the percentile relationship between total and school census population can be estimated with reasonable accuracy? Cannot standard percentile relationships be found which will assist in the enforcement of the compulsory attendance laws so that no children provided for by a school building program may be denied the educational opportunities offered, and the plant itself may function properly in the lives of the children for whom it has been erected?

It appears, in answer to the first question, that though uniformity and accuracy are apparently lacking in the determination of school census lists, such data as are available may be of value, as compiled

in Table XIII, in establishing the range of such percentages as might with reason be expected.

This table, giving the frequency of the occurrences of percentile relations existing between school and total population, shows percentages higher than forty. Table XIII is compiled from a study of two hundred and thirteen cities, the majority of these cities appearing twice since their percentile ratios for both 1900 and 1910 were taken. It was necessary to eliminate a number of cities for which no data appeared in the reports of the Commissioner of Education. Though the school census age period by which the school population was determined may have differed in 1910 from that in 1900, both relationships were recorded in this table. That there is need for a uniform national basis for computing school census is evident from the compilation. The reports of the Commissioner of Education show that at least twenty-seven different age periods have been utilized since 1900 in securing school census data in the various cities of the United States. The figures of Table XIII are limited to twenty-three of these age periods.

An examination of the age periods draws attention to the wide range of percentages prevailing under each period. From an examination of the 6-21 year group a natural inference may be made that school census figures are not always gathered with the utmost accuracy. It seems incredible that in one city the 6-21 year group should only represent 13 per cent of the total population, while in other cities they form 39 per cent, 42 per cent, or even 52 per cent of the entire population. The median percentage, 25.9 per cent, obtained from the 103 cases under the 6-21 year group, may be used as a fair measure for comparison with other school systems.

The report of the Bureau of the Census for the thirteenth census of the United States, made in 1910, gives figures for the 5-14 year group in cities of 25,000 and over, which do not show the wide distribution which is indicated by the school census figures given by the Commissioner of Education in his reports for 1900 and 1910. Table XIV shows the percentile distribution of the 5-14 age group in 229 cities. The median city for this group shows a percentage of 17.06, while the middle 50 per cent of the cities runs between 16.19 per cent and 18.76 per cent.

Table XV gives a re-grouping of the cities reported by the Commissioner of Education, in the two reports mentioned, on the basis

TABLE XIII
 FREQUENCY OF THE OCCURRENCE OF PERCENTAGES FOUND TO EXIST BETWEEN SCHOOL POPULATION AND TOTAL POPULATION
 Arranged according to the number of years included in the census-age-periods. 383 cases from 213 cities over
 25,000 population (census of 1910). Percentages established on figures of 1900 and 1910 census

Per cent	4-16	4-18	4-20	4-21	5-15	5-16	5-17	5-18	5-20	5-21	6-14	6-16	6-18	6-20	6-21	7-14	7-15	7-17	7-20	7-21	8-17	8-18	8-19
8					1																		
9					1																		
10					1																		
11					1																		
12					1																		
13					1																		
14					1																		
15					4																		
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42					1																		
48					1																		
52					1																		
55					1																		
60					1																		
Totals	14	5	18	3	45	3	16	43	21	47	2	5	12	18	103	4	1	6	4	7	4	1	1
Median	23.00	19.3	31.00	24.00	16.08	16.00	20.50	21.44	23.75	27.60	13.5	16.00	27.00	30.00	25.02	11.17	19.00	18.17	22.00	25.00	17.00	18.00	16.00

TABLE XIV
PERCENTILE DISTRIBUTION BY THE 5-14 AGE GROUPS OF POPULATION
IN CITIES FROM 25,000 TO 500,000
United States Census of 1910

Per cent	Age period, 5-14 years		Total
	Cities over 100,000	Cities 25,000-100,000	
10			
11			
12	2	1	3
13	2	3	5
14	2	8	10
15	11	22	33
16	4	29	33
17	14	40	54
18	8	36	44
19	5	20	25
20	2	15	17
21		3	3
22		1	1
23		1	1
24			
25			
Total	50	179	229
Median percentage	16.79	17.16	17.06

of the number of years of age included in the age periods. For instance, the 5-15, 6-16, 7-17, and 8-18 age periods are combined, since each age period covers ten years. The other combinations have been made in a like manner. This table thus permits of the calculation of a median for each of the ten groups which result from these combinations. The medians are as follows:

Groups representing number of years	Median percentages
7	11.17
8	16.
9	17.
10	16.58

A School Building Program for Cities

<i>Groups representing number of years</i>	<i>Median percentages</i>
11	16.
12	23.3
13	21.45
14	28.50
15	25.58
16	27.94

The assumption may be made that these medians have a fair degree of reliability, since there is a fairly continuous upward trend in the table. The medians may be utilized as one means of judging the accuracy of any one group of census figures, with the limitations that must result from any unusual local conditions.

Not only is the ratio existing between school and total population of importance in its relationship to the school building program, but it is highly desirable to know the relative constancy or lack of constancy of such ratio. A distribution is made in Table XVI of the differences found to exist in the percentages which the school-census population bears to the total population at two different periods. The percentages were determined from comparisons of the school census population as found in the annual reports of the Commissioner of Education for 1899-1900 and 1900-1910 with the total population of the United States Decennial Census of those two periods.

From this tabulation it is found that the median change that took place in 124 cities in the percentile relationships existing between school population and total population in 1900 and 1910 was 3.17 per cent. In other words, as cities grow the change in many instances that takes place in the proportion of the entire population that are of school age is very slight. In nine cases the figures as given in the annual reports of the United States Commissioner of Education, from which this tabulation was made, show a difference of over 10 per cent for the two decades. That error, either typographical or clerical, is responsible for extremely high percentages may be inferred. It is also recognized that in some cases it has been necessary for the local reporting officer, owing to the non-existence of the necessary data, to base his 1910 report on the 1900 relationship.

TABLE XV: FREQUENCY OF PERCENTAGES FOUND TO EXIST BETWEEN
SCHOOL POPULATION AND TOTAL POPULATION

Involving 213 cities over 25,000 (United States Census of 1910). Compiled from reports of United States Commissioner of Education, 1899-1900 and 1909-1910. Arranged according to the number of years included in the census-age-periods.

Number of years	7-14	6-14 7-15	8-17	5-15 6-16 7-17 8-18	5-16 8-19	4-16 5-17 6-18	5-18 7-20	4-18 6-20 7-21	5-20 6-21	4-20 5-21
8%				1						
10				1						
11	3 ¹⁰	1		1						1
12	1			2			1			
13				1	1				1	
14			1	5					1	
15				10		1				2
16		1	1	7	2	3	1		4	2
17				6		1	2	1	3	
18			1	10	1	3	6		2	2
19		1	1	5		3	1	4	4	
20				2		3	3	1	4	
21				1		3	10	1	7	2
22				3			5	1	11	2
23				2		5	7		5	1
24						5	5	1	12	5
25						3	1	2	7	4
26						1		1	12	4
27						3	2	2	10	4
28						1	1	1	7	8
29							1	3	8	4
30						1		3	5	
31						2			3	5
32						2		1	2	4
33						1			4	3
34								2	2	3
35									2	6
36							1	1	2	2
37									2	1
38								1	1	
39								1	1	
41								1		
42									1	
48								1		
52									1	
55								1		
60						1				
Totals	4	3	4	57	4	42	47	30	124	65
Median	11.17	16.00	17.00	16.58	16.00	23.3	21.45	28.50	25.58	27.94

¹⁰ Read: Three cities with 7-14 years as census-age-periods reported school populations which were eleven per cent of the total population.

How this relationship may be utilized as a basis for determining approximate future school enrollment is shown in the following excerpt from the Great Neck survey of 1917.¹¹ In this suburban community, which was being newly developed in 1900-1915, the possibility of considerable change in the percentile relationship was due to the fact that many young people whose families had not reached normal size were building homes there. Having already

TABLE XVI

DIFFERENCES IN THE PERCENTAGES WHICH THE SCHOOL CENSUS
POPULATION BEARS TO THE TOTAL POPULATION AS CITIES GROW IN SIZE

This tabulation includes only cities of 25,000 or over, as determined by the United States Census figures of 1910. A uniform age basis for securing school census has not been adopted in the United States. Therefore distributions have been made on each of the prevailing bases. The figures for school census population and for city population were taken from the annual reports of the United States Commissioner of Education for 1899-1900 and 1909-1910. The city population figures are the United States Decennial Census figures for 1900 and 1910. Cities which had changed their age basis for securing school census in 1910 from that used in 1900 were necessarily excluded from the tabulation.

Differences in per- centages 1900-1910	Number of cities having differences listed according to the age basis used for securing school census															Total
	4- 16	4- 18	4- 20	5- 16	5- 17	5- 18	5- 15	5- 20	5- 21	6- 18	6- 20	6- 21	7- 14	7- 21	6- 14	
0						2	1		2		1	7	1			14
1			1			1	7	2	1		1	4				17
2	1	1	2		1	2	7	1	4			1				20
3			1			3	2	1	1		1	6				16
4	2		2		1		1		2	1		8				17
5	1			1	2			2		1		3			1	11
6	1							2	3	1	1	2				10
7							2		1	1	1	1		1		7
8									1			2				3
9																
10																
Over 10					3						1	5				9
Totals	5	1	6	1	8	8	20	8	15	4	6	39	1	1	1	124

Median for entire distribution — .0317

¹¹ Strayer and Neale, *Great Neck School Survey*, Great Neck Association, Great Neck, L. I.

established the probable total population for a period of twenty years in this community, Dr. Strayer in this survey utilizes this as the basis for the determination of future school population.

At the present time 16.5 per cent of the population of the existing Great Neck school district are enrolled in school. As the population increases, and the percentage of relatively old population becomes larger, the percentage of the population attending school will undoubtedly increase. In the part of Queens County immediately adjacent to the Great Neck area the number of persons between six and twenty years of age attending school in 1910 formed 19.8 per cent of the total population.

This statement is based on computations made from data in *Statistical Sources for Demographic Studies of Greater New York*, Vol. I, pp. 647-686. The following table gives a summary of the data:

<i>Ages</i>	<i>6-14</i>	<i>1-5</i>	<i>6-9</i>	<i>10-14</i>	<i>15-17</i>	<i>18-20</i>	<i>Over 20</i>	<i>All ages</i>
Total population	6,405	4,463	2,799	3,604	1,920	2,194	22,181	37,171
Number in schools	5,933	0	2,509	3,474	1,006	295	0	7,364
Per cent in schools	81.1	0	34	47	14	4	0	19.8

In the first assembly district of Queens County the percentage was 20.4; in the second, 19.88; in the third, 20.3; in the fourth, 20.3; and for all of Queens County, 20.3. In the Richmond Borough the number of persons between six and twenty years of age in school was 20.5 per cent of the population, in Yonkers, 19.2; and in Mount Vernon, 19.7.

It therefore seems reasonable to assume that by 1920 the total number of persons between six and twenty years of age attending school in the Great Neck area will form nineteen per cent of the total population. This figure will in all probability be slightly exceeded before 1940, and may be considered as safely conservative. On this basis the total number of school pupils to be provided for will be as shown in Table XVII.

The basis for the determination of school building needs is the relationship between growth in school attendance and in the number of classrooms provided for children, expressed also in terms of the total number of sittings furnished. As has been shown, the measure for the determination of sufficiency in school attendance or school enrollment should be the school census. As, in many of our

American cities, private and parochial schools also draw upon the school census figures for their enrollment, it is necessary to secure accurate figures of enrollment and attendance from such schools in order to develop the most satisfactory building program.

Table XVIII presents the initial comparison of school population and city population for a school building program. The city population figures should be the most accurate obtainable, preferably the figures of the United States decennial censuses and state or otherwise officially authorized intermediate censuses.

TABLE XVII
ESTIMATED POPULATION AND PROBABLE TOTAL SCHOOL ENROLLMENT
IN THE GREAT NECK VILLAGE AND GREAT NECK STATION AREAS
FROM 1920-1940

Year	Great Neck Village		Great Neck Station	
	Total population	Probable school enrollment	Total population	Probable school enrollment
1920	3,141	597	2,250	427
1925	3,641	692	3,650	693
1930	4,241	806	5,550	1,054
1935	4,941	939	7,750	1,472
1940	5,741	1,091	10,100	1,919

The total population figures of this table are those of the *Financial Statistics of Cities*. The school census-age-period is six to twenty-one. Such data, as given in Table XVIII, should cover a period of at least twenty years where a program is actually being developed.

Table XIX will give the proportion of children in public, private, and parochial school enrollment with comparison of the total with the school census figures.

Evidently the building program in Rockford does not involve any great consideration of school enrollment outside of the public schools. This situation may be contrasted with that found in many other American cities where the problem of school building planning becomes much more involved because of the large percentage of children in other than public schools.

Table XX points out clearly the need for full consideration of the percentages of columns 6, 7, and 8. Column 6 indicates that

for Dunkirk, N. Y., the public school building policy has of necessity involved an approximate average of 66 per cent of all children enrolled in school during the period 1900-1916 and hence a smaller percentage of the school census.

Unfortunately the articulation between public, private, and parochial schools has in many cities not been such that accurate figures for column four may be obtained. It is highly essential and

TABLE XVIII
RELATIONSHIP BETWEEN TOTAL POPULATION AND SCHOOL CENSUS,
ROCKFORD, ILL.

<i>Year</i>	<i>Total population</i>	<i>School census</i>	<i>Relationship between school census and total population Per cent</i>
1910	45,401	10,959	24
1911	48,068	11,375	23.6
1912	49,491	11,904	24
1913	50,914	11,604	22.7
1914	51,337	12,148	23.6

TABLE XIX
DISTRIBUTION OF CHILDREN IN PUBLIC AND OTHER SCHOOLS
FOR 1910-1914, ROCKFORD, ILLINOIS ¹³

<i>Year</i>	<i>Children of school census age 6-21</i>	<i>Children in public schools</i>	<i>Children in private schools</i>	<i>Total school enroll- ment</i>	<i>Percentage of total school enrollment in public schools</i>	<i>Percentage of total school enrollment in private schools</i>	<i>Percentage of school census in school</i>
1910	10,959	7,504	543	8,047	93	7	68
1911	11,375	7,983	560	8,543	93	7	70
1912	11,904	8,091	712	8,803	92	8	68
1913	11,604	8,369	883	9,252	90	10	72
1914	12,148	8,645	820	9,465	91	9	71

¹³ Data from the *Report of the United States Commissioner of Education, 1910-1914.*

no doubt economically advantageous to a community to secure the utmost of coöperation between all schools providing educational opportunities for children. The figures given in Table XX should be free from duplications due to transfers from one type of school to the other. A central system of census registration for all children with uniform child accounting methods employed in all types of schools will alone produce dependable data.

A very desirable measurement which would naturally follow the above distributions of children is the relationship existing between total enrollment of all children and building accommodations of public, private, and parochial schools as well as between average daily attendance and building accommodations of the same schools. In securing the figure for total school building accommodations of the city much caution is necessary. The following difficulties must be met. Elementary classrooms must be uniformly counted as accommodating forty children each unless used for special class purposes. In the latter case these rooms must be included as

TABLE XX
DISTRIBUTION OF CHILDREN IN PUBLIC AND NON-PUBLIC SCHOOLS,
1900-1916, DUNKIRK, N. Y. ¹³

<i>June</i>	<i>School census of children 4-18 years</i>	<i>Chil- dren in public schools</i>	<i>Chil- dren in paro- chial schools</i>	<i>Total at- tended all schools</i>	<i>Percentage of total enrollment in public schools</i>	<i>Percentage of total enrollment in parochial schools</i>	<i>Per- centage of census in all schools</i>
<i>Col. 1</i>	<i>Column 2</i>	<i>Col. 3</i>	<i>Column 4</i>	<i>Column 5</i>	<i>Column 6</i>	<i>Column 7</i>	<i>Column 8</i>
1900	In 1897—2,916 In 1901—2,941	1,755	837	2,592	68	32	85
1905	3,350	1,849	930	2,779	66	34	80
1910	3,967	2,415	1,290	3,705	65	35	93
1911		2,427	1,562	3,989	61	39	
1912		2,405	1,559	3,964	61	39	
1913		2,977	1,318	4,295	69	31	
1914	4,400	2,650					
1915	4,800	2,949	1,685	4,634	63	37	97
1916	5,000	3,309	1,358	4,667	71	29	93

¹³ *Triennial Report, Dunkirk, N. Y., Public Schools, 1916.*

accommodating the maximum number of children desirable in such special groups. The maximum kindergarten accommodations, without duplication of morning and afternoon sessions, will form a part of the total. The difficulty of ascertaining with exactness the number of students for whom accommodations can be found in the high schools, coupled with the lack of uniformity in reckoning such data, must be recognized. It is wise to provide divisions in the table by which the high school and elementary school elements may be studied separately.

Having made comparisons of this nature between the school enrollment and average daily attendance and seating accommodations of all the schools of the city, it becomes necessary to show the relationships, on the same basis, for each set of schools, i. e., public, parochial, and private. It no doubt will become clear in communities where the parochial enrollment is a large percentage of the total enrollment that the public school system, in providing housing accommodations, has conformed more reasonably to the 'forty pupils per room' standard than the parochial school. Parochial schools with average enrollments of seventy pupils or more per classroom will have brought to their attention the need for conformance with a better standard.

In order to provide the most complete analysis of school housing needs involving all the schools of a city, a percentile classification of all elementary classrooms, both parochial or private, arranged according to the number of children housed therein, will show the situation most clearly. Such a tabulation will take the following form:

	<i>Number and percentage of all classrooms</i>							
	<i>Public</i>		<i>Parochial</i>		<i>Private</i>		<i>Total</i>	
	<i>Number</i>	<i>Per cent</i>	<i>Number</i>	<i>Per cent</i>	<i>Number</i>	<i>Per cent</i>	<i>Number</i>	<i>Per cent</i>
<i>Classrooms having enrollments of</i>								
20 pupils or less								
21-25 pupils								
26-30 pupils								
31-35 pupils								
36-40 pupils								
etc.								

Most frequently the attempt is made in reports of superintendents of schools to express this information in terms of the average number of pupils per teacher based on average daily attendance. Table XXI, from the *St. Paul Survey*, is a sample of such compilations, distributed by schools over a period of six years. The survey states that "no statistics of this kind were available in the superintendent's office, and they were only obtained after much effort. It will be seen that the average for the city in the grade schools has been very large for a period of years. There is no place for the addition of pupils without seriously impairing the efficiency of instruction." It is quite true that enrollment or attendance distributions of this kind are unfortunately not always available in the data collected in school offices. In the form given in Table XXI the information may be misleading.

Table XXII ¹⁴ is far more illuminating. It becomes quite clear why this table is vital in any building study. In the five-year period the mode shifts from the 40-45 group of average number belonging to the 35-40 group. In the same period this shift necessitated an addition of 105 teachers to the elementary staff in spite of the fact that the elementary school enrollment was practically at a standstill for this same period, as shown on page 17 of this report. The addition of 105 teachers means, with possibly slight exceptions, the provision of 105 more elementary classrooms.

If Louisville desired to reduce the burdens of the seventy teachers having over forty-five pupils belonging on the average, the cost in new building construction might easily be estimated. Seven thousand dollars per classroom was a fair estimate of elementary building costs previous to 1914. This amounts to approximately \$155 for each child for whom provisions would be necessary if the limit of pupils per teacher were set at forty-five.

3. GEOGRAPHICAL DISTRIBUTION OF POPULATION

Dot maps illustrating densities of total population and of school population show frequently no conformity in the distributions. In other words, density of child population does not shift with density of total population. This was borne out clearly in the school building program as laid out by Strayer and Trabue for the community

¹⁴ *Fifth Report of the Board of Education, Louisville, Ky., 1915-1916, p. 29.*

TABLE XXI

AVERAGE NUMBER OF PUPILS PER TEACHER, BASED ON
AVERAGE DAILY ATTENDANCE

St. Paul, Minnesota

	1910-1911	1911-1912	1912-1913	1913-1914	1914-1915	1915-1916
Adams	39	39	40	32	34	36
Ames	33	34	41	37	45	36
Baker	38	40	40	35	35	31
Cleveland	31	38	39	38	35	36
Crowley	38	36	34	44	41	35
Davis	40	40	39	39	39	36
Dean	28	26	31	30	32	29
Douglas	45	43	44	40	45	42
Drew	49	40	41	44	42	36
Edison				45	43	44
Ericson	38	43	43	42	44	45
Franklin	41	39	34	35	37	46
Galtier		34	36	41	42	39
Garfield	39	41	41	39	47	
Girls' Home					8	20
Gordon		33	33	37	36	43
Gorman	47	40	37	39	39	51
Grant	41	37	37	37	35	37
Hancock	45	41	39	43	43	31
Harrison	45	37	41	38	33	37
Hawthorne	42	42	35	41	39	43
Hendricks	44	38	38	41	44	42
Hill	44	42	37	38	40	43
Homecroft				32	28	32
Irving	42	38	39	38	41	39
Jackson	46	39	41	41	36	33
Jefferson	40	36	38	41	36	37
Lafayette	47	50	41	45	36	39
Lincoln	36	36	37	37	36	31
Logan	29	30	27	27	33	21
Longfellow	40	39	36	33	35	38
McClellan	40	37	41	38	36	42
McKinley	43	40	38	36	33	42
Madison	42	39	32	36	32	38
Mattocks		29	32	17	19	22
Maxfield	42	41	41	43	42	37
Monroe	42	43	36	39	33	34
Mound Park	41	43	40	34	31	33
Murray	37	38	38	41	31	36
Neill	38	36	33	30	42	36

TABLE XXI (Continued)

	1910-1911	1911-1912	1912-1913	1913-1914	1914-1915	1915-1916
Phalen Park	43	43	41	39	41	42
Quincy	22	25	26	20	22	38
Ramsey	37	46	47	40	34	39
Randolph				38	61	41
Rice	27	32	24	38	52	38
Scheffer	41	40	41	38	37	42
Sheridan	30	31	22	25	27	34
Sibley	41	39	43	38	38	45
Smith	40	35	36	31	39	33
Taylor	26	20	15	29	28	26
Tilden	34	29	34	27	28	25
Van Buren	35	34	33	31	37	34
Webster	33	35	33	37	38	36
Whittier	40	40	39	37	44	38
Entire City	39.7	38.2	37	37.6	36.9	37.6

of Pelham, N. Y., in May, 1917. The following is an excerpt from their report ¹⁵ to the Board of Education.

During the five-year period between the federal census of 1910 and the state census of 1915, the population of the town of Pelham increased from 2,998 persons to 3,782—an increase of twenty-six per cent. That section of the town lying north of the New Haven Railroad, known as the village of North Pelham, increased during this period from 1,311 to 1,874 persons—an increase of forty-three per cent. The Pelham Heights section had a sixteen per cent increase during this five-year period, while the Pelham Manor section increased only eleven per cent. The best estimate we have been able to make of the present distribution of population indicates that there are very nearly 4,000 persons now living in the town, half of them living north and half of them living south of the New Haven Railroad. It may reasonably be expected that the town of Pelham will contain 6,000 persons by the year 1925. Under normal circumstances this would mean that school accommodations would be necessary for at least 1,200 pupils by that time.

From information furnished by the pupils who attended school on Monday, May 14, we find that the average family supplying children for the schools from the Pelham Manor and Pelham Heights sections, contains 4.7 persons. The average school family in that section of North Pelham, known as Pelhamwood, contains 3.9 persons, while the average family supplying the schools from the remainder of North Pelham contains 5.5 persons. The average

¹⁵ Unpublished.

TABLE XXII

PUPILS PER TEACHER IN THE ELEMENTARY GRADES

The success of the Board of Education in so administering the school funds that 613 teachers are now employed in the regular elementary grades, as against 508 in January, 1911, has resulted in greatly reducing the number of abnormally large classes. This is shown in the following table.

<i>Average number belonging per teacher</i>	<i>January 1911</i>	<i>October 1912</i>	<i>October 1913</i>	<i>October 1914</i>	<i>October 1915</i>	<i>October 1916</i>
15- 20			9	7	4	6
20- 25	18	16	20	18	18	33
25- 30	34	40	34	72	63	56
30- 35	55	91	84	88	86	119
35- 40	72	122	119	133	146	202
40- 45	96	124	145	125	183	127
45- 50	90	87	91	88	71	51
50- 55	53	41	39	38	19	17
55- 60	40	17	12	11	8	2
60- 65	26	4	4	1		
65- 70	12	1	1	2		
70- 75	3	1		1		
75- 80	4			1		
80- 85	1					
85- 90	1					
90- 95	1					
95-100	1					
100-105	1					
<i>Total number of teachers</i>	508	544 ¹⁵	558 ¹⁵	585 ¹⁵	598 ¹⁵	613 ¹⁶

family in general throughout New York State and the United States as a whole, was composed in 1910 of about 4.5 persons. The small size of the Pelhamwood families is partly due to the fact that this section is being developed just now, and that the great majority of those who are building homes here are young people whose families may be expected to reach the normal size during the next ten years. The problem of elementary school accommodations for the children of Pelhamwood will probably become most urgent in about five years.

¹⁵ See Louisville report for special teachers not included here.

It becomes clear that a distribution of total city population by school districts or by wards and years of a past decade on the basis of the number of persons per family, coupled with a comparison with national urban figures for the same period, will tend to show the general trend of growth in the younger elements of population. Such a distribution made by the Nebraska Telephone Company, involving the years 1900 and 1910, with an estimate for the year 1933, is given in Table XXIII.

TABLE XXIII

PERSONS PER FAMILY DISTRIBUTED BY WARDS, OMAHA, NEB.

<i>Years</i>	<i>1900</i> ¹⁷	<i>1910</i>	<i>1933 (estimated)</i>
Ward 1	4.86	4.71	4.6
2	4.62	4.75	4.6
3	6.02	7.03	8
4	5.53	6.61	6
5	4.61	4.11	4.1
6	4.72	4.22	4.3
7	5.07	4.63	4.45
8	4.78	4.79	4.65
9	4.77	4.5	4.4
10		4.47	4.45
11		4.52	4.5
12		4.35	4.45

The estimates for 1933 are based on considerations of the urban changes in the United States during the first part of the period, the ages and characteristics of the families involved in the study when made in 1913, as well as the nationalities included in the various wards.

When Table XXIII is coupled with a tabulation showing the number of families by wards, its value in prognosis becomes apparent. Table XXIV presents the statistics for Omaha with the distribution by families for 1900-1910, with the estimate for 1933.

A critical study of these tables will bring to light many points of value in schoolhouse planning. The following inferences may have some validity.

¹⁷ Wards 10, 11, and 12 were not included within city boundaries at this period.

Ward 3 may present for instruction more than the normal number of children per family, but the ward is becoming undesirable from the standpoint of residence. Wards 5 and 7 will send to school but few children per family, but are two of the most rapidly growing wards. Ward 1 contains more of the older families, and will see few changes in the next few years.

If Tables XXIII and XXIV were to be studied in the light of the ward areas, or in terms of density of square mile of available

TABLE XXIV
OMAHA FAMILIES DISTRIBUTED ACCORDING TO WARDS

<i>Years</i>	<i>1900 ¹⁸</i>	<i>1910</i>	<i>1933 (estimated)</i>
Ward 1	2,083	1,937	2,390
2	3,211	2,468	3,290
3	1,941	1,091	607
4	1,936	1,542	2,000
5	1,950	2,906	4,975
6	3,600	2,423	3,490
7	1,872	2,134	4,500
8	2,313	1,766	1,935
9	1,817	2,600	4,617
10		2,106	2,240
11		2,050	3,634
12		3,336	8,080
	20,723	26,359	41,758

area, with such omissions as parks, railroads, and other areas not utilized in housing, the wide dispersion of population in certain wards with a higher concentration in other wards, would appear as facts of exceeding importance in school building planning. Ward 3 of Tables XXIII and XXIV would change from a square mile density of 87,000 in 1910 to an estimated density of 55,000 in 1933, while Ward 9 would shift from a 9,600 square mile density in 1910 to an estimated density of 16,700 per square mile in 1933. Such facts might be best presented by dot maps for each period, thus providing means for a clear visualization of the contrast.

¹⁸Wards 10, 11, and 12 were not included in city's boundaries at this period.

The assumptions regarding nature of growth in various sections of a city have been very clearly expressed in a map appearing in *A Constructive Survey of the Milwaukee School Buildings and Sites of 1916*. This map is reproduced in Fig. 5.

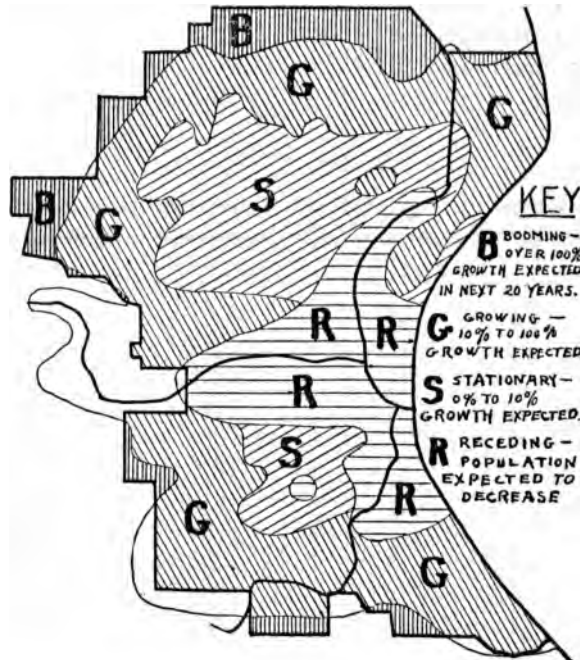


FIG. 5

The city is here divided into sections and marked *B*, *G*, *S*, or *R*, according to the expected nature of the change¹⁹ in population for a period of ten years, the letters being explained in the key connected with the figure. The Milwaukee Committee followed this map in their survey with a second map re-dividing the city into thirteen other sections composed of groupings of school districts. This rearrangement permitted of discussion and suggested solutions of sectional problems. The assumptions regarding nature of population growth appearing in Fig. 5 are of value in estimating growth of school population and its geographic distribution only as the

¹⁹ Data furnished by the Wisconsin Telephone Company.

assumed elements of growth that overlap existing school district boundaries are given proportional consideration in the estimates of future school population in such districts.

Utilizing a most conservative and thorough study of expected increases in city population over the period 1913-1933, distributed by wards, made by the Nebraska Telephone Company in Omaha, Nebraska, the author found it possible to re-apportion population on a basis of school districts rather than wards. This re-apportionment is shown in Table XXV. The expected percentages of increase by wards had been carefully estimated by the Telephone Company after having made a study of housing conditions and future housing possibilities. The author, with the aid of Mr. Everts, of the Telephone Company, who had had an active part in the original study of the Telephone Company, carefully covered the entire city area and determined on the percentages of growth, as indicated in the table, for the several school districts of the city. The original study involved the period 1913-1933. The school district study involved the period 1917-1933.

The expected percentage of growth in total population may be utilized in determining estimates of growth in school population for the same period. Table XXVI follows this suggestion. This table gives the enrollment by school districts for the kindergarten and the first six grades of the city of Omaha for 1917, the expected percentage in growth in total population 1917-1933, and the estimated enrollment for the kindergarten and first six grades in 1933 based upon this same expected percentage of growth. This table points out that Omaha may expect an elementary enrollment of 29,254 in 1933, or an increase of 8,717 children from the figures of 1917. At the time the Omaha survey was made, 4,156 children of Grades VII and VIII were being housed in the elementary schools. It was suggested that if the elementary buildings were relieved of the necessity of housing children of these two grades, the elementary plant, with a few changes and with the present new buildings completed, might well be expected to provide sufficient accommodations for all children from the kindergarten through the sixth grade for the next eight years. The conclusion was based upon the assumption that the expected increase in the period 1917-1933 would be reasonably regular.

TABLE XXV

THE POPULATION OF THE CITY OF OMAHA DISTRIBUTED BY SCHOOL
DISTRICTS

*Calculations based upon a house count made by the Nebraska Telephone Company
in 1913, and an estimated growth in the various districts from 1913 to 1933*

<i>Name of school district</i>	<i>Estimated population in 1917</i>	<i>Expected percentage of increase between 1917 and 1933</i>	<i>Population of 1933</i>
Bancroft	2,594	35.0	3,490
Beals	2,699	121.0	5,955
Brown Park	2,656	18.0	3,140
Cass	4,824	1.1	4,880
Castelar	3,486	25.9	4,390
Central	8,076	24.8	10,080
Central Park	3,420	119.3	7,500
Clifton Hill	2,770	110.5	5,830
Columbian	5,139	96.8	10,115
Comenius	3,950	5.1	4,150
Corrigan	2,134	32.6	2,830
Druid Hill	1,332	42.6	1,900
Dundee	3,360	108.3	7,000
Dupont	2,068	13.1	2,340
Edward Rosewater	2,282	17.0	2,670
Farnam	3,896	35.5	5,280
Franklin	3,510	35.3	4,750
Garfield	2,251	3.7	2,335
Hawthorne	1,860	12.9	2,100
Highland	2,180	33.0	2,900
Howard Kennedy	994	78.1	1,770
Jungmann	2,400	16.6	2,800
Kellom	7,878	14.6	9,030
Lake	5,006	14.9	5,750
Lincoln	3,214	10.5	3,550
Long	5,390	11.1	5,990
Lothrop	10,630	24.8	13,270
Lowell	1,080	1.9	1,100
Madison	1,380	23.2	1,700
Mason	8,160	25.2	10,220
Miller Park	3,440	152.9	8,700
Monmouth Park	2,996	99.6	5,980
Pacific	7,590	3.7	7,870
Park	4,593	19.6	5,925

TABLE XXV—(Continued)

<i>Name of school district</i>	<i>Estimated population in 1917</i>	<i>Expected percentage of increase between 1917 and 1934</i>	<i>Population of 1933</i>
Saratoga	5,158	84.4	9,510
Saunders	4,583	56.1	7,155
Sherman	770	129.8	1,770
South Central	5,128	6.5	5,460
South Franklin	2,248	82.4	4,100
South Lincoln	2,906	7.7	3,130
Train	2,160	11.1	2,400
Vinton	3,696	16.8	4,320
Walnut Hill	3,250	43.6	4,670
Webster	7,926	35.6	10,750
West Side	3,352	32.5	4,440
Windsor	2,440	55.7	3,800
<i>Total</i>	<i>170,765</i>		<i>238,795</i>

The Trend of Population in a Large City

In making recommendations for the locations of buildings in the survey conducted in St. Paul in 1917, consideration was given to every possible means for determining the growth in the various sections of the city. In order to show the trend of population, the following data were utilized: (1) the numbers of voters by wards in mayoralty campaigns; (2) the number of dwelling permits officially issued from 1910 to 1917; (3) the present and prospective location of factories; (4) the extension of lines planned by the telephone companies; (5) the desirable territory still available for home sites; (6) the increase in elementary school children in the various wards; (7) growth of the city in land additions. It will be noted that all of these data pointed to the 7th, 10th, 11th, and 12th wards as the wards of greatest growth.

1. The returns in the mayoralty campaigns indicated substantial growth in the numbers of voters in Wards 1, 2, 5, 6, 7, 10, 11, and 12. The last three showed the greatest development.

2. The dwelling building permits issued showed the greatest increases in Wards 1, 2, 5, 6, 7, 8, 10, 11, and 12. In Table XXVIII

TABLE XXVI

ESTIMATED ENROLLMENT IN THE ELEMENTARY SCHOOLS FROM THE KINDERGARTEN THROUGH THE SIXTH GRADE FOR THE YEAR 1933 BASED UPON THE ENROLLMENT IN 1917, AND THE ESTIMATED PERCENTAGE OF INCREASE IN THE TOTAL POPULATION OF EACH SCHOOL DISTRICT FOR THE PERIOD 1917 TO 1933

<i>Name of school district and building</i>	<i>Enrollment 1917</i>	<i>Expected percentage of growth 1917-1933</i>	<i>Estimated enrollment for 1933</i>
Bancroft	354	35.0	478
Beals	239	121.0	528
Belvidere	133	99.6	398
Brown Park	428	18.0	505
Cass	479	1.1	484
Castelar	508	25.9	640
Central	686	24.8	856
Central Park	386	119.3	847
Clifton Hill	480	110.5	1,010
Columbian	413	96.8	813
Comenius	441	5.1	463
Corrigan	396	32.6	525
Druid Hill	249	42.6	355
Dundee	486	108.3	1,012
Dupont	104	13.1	118
Edward Rosewater	318	17.0	372
Farnam	594	35.5	805
Franklin	518	35.3	701
Garfield	192	3.7	199
Hawthorne	276	12.9	312
Highland	320	33.0	425
Howard Kennedy	587	78.1	1,045
Jungmann	315	16.6	367
Kellom	876	14.6	1,004
Lake	800	14.9	919
Lincoln	461	10.5	509
Long	805	11.1	894
Lothrop	816	24.8	1,108
Lowell	100	1.9	110
Madison	235	23.2	290
Mason	704	25.2	881
Miller Park	508	152.9	1,285
Monmouth Park	460	99.6	918
Pacific	388	3.7	402

TABLE XXVI—(Continued)

<i>Name of school district and building</i>	<i>Enrollment 1917</i>	<i>Expected percentage of growth 1917-1933</i>	<i>Estimated enrollment for 1933</i>
Park	602	19.6	720
Saratoga	485	84.4	894
Saunders	354	56.1	553
Sherman	216	129.8	496
South Central	343	6.5	365
South Franklin	250	82.4	456
South Lincoln	365	7.7	393
Train	545	11.1	605
Vinton	365	16.8	416
Walnut Hill	387	43.6	556
Webster	463	35.6	628
West Side	561	32.5	743
Windsor	546	55.7	850
<i>Total</i>	<i>20,537</i>		<i>29,254</i>

TABLE XXVII

WARD INCREASES IN VOTERS IN ST. PAUL CITY ELECTIONS FOR MAYOR

<i>Wards</i>	<i>1900</i>	<i>1904</i>	<i>1906</i>	<i>1908</i>	<i>1910</i>	<i>1912</i>	<i>1914</i>
1	2,547	2,638	2,762	3,270	3,148	3,561	3,425
2	2,164	2,379	2,674	3,037	3,053	3,408	3,344
3	1,114	1,249	1,149	1,114	1,129	1,028	779
4	2,220	2,485	2,313	2,321	2,369	2,069	1,935
5	2,529	2,664	2,830	3,248	3,236	3,581	3,315
6	2,395	2,717	2,702	3,152	3,057	3,321	3,236
7	2,288	2,602	2,814	3,650	3,605	4,106	4,312
8	3,795	4,173	4,590	4,016	3,855	4,064	4,031
9	2,348	2,602	2,434	2,701	2,447	2,572	2,490
10	815	1,137	1,127	1,489	1,588	1,972	2,151
11	651	853	1,095	1,662	1,888	2,691	2,875
12				1,472	1,586	2,040	2,157
<i>Total</i>	<i>22,857</i>	<i>25,499</i>	<i>26,490</i>	<i>31,042</i>	<i>30,759</i>	<i>34,493</i>	<i>34,046</i>

are given the numbers of permits issued for each ward for the years 1910-1916. The number of dwellings erected was considered a better index than total dwelling costs.

3. The industrial map of the city offered opportunity for noting the dispersion of factories over the entire city area and the tendency for workers to seek homes near their working centers. Prospective developments in respect to railroad, belt lines, and possible factory and packing-house sites, were considered through the agency of the map.

4. The telephone companies were planning the greatest extension of their trunk lines in the 11th, 5th, and 12th wards, in the order given.

5. From Table XXIX, which gives the population of the city by wards, it was observed that Wards 2, 10, and 11 have the lowest density of population in the city. These wards have many available home sites that are now vacant.

6. The tabulation of all children attending the elementary public schools of the city showed the greatest growth in the 7th, 10th, and 11th wards.

TABLE XXVIII

NUMBERS OF DWELLING BUILDING PERMITS ISSUED IN ST. PAUL,
1910-1916. DISTRIBUTION BY WARDS

<i>Wards</i>	<i>1910</i>	<i>1911</i>	<i>1912</i>	<i>1913</i>	<i>1914</i>	<i>1915</i>	<i>1916</i>	<i>Total</i>
1	132	105	69	69	108	133	144	730
2	112	125	129	156	111	137	152	922
3	1	2	5	1	2			11
4	10	2	2	1		4	8	27
5	99	69	93	94	90	84	105	634
6	117	88	100	85	87	105	73	655
7	119	127	161	141	122	139	112	921
8	101	95	76	79	57	59	42	509
9	39	43	24	30	26	19	21	202
10	188	238	225	204	270	242	218	1,585
11	325	183	242	321	328	361	308	2,068
12	173	188	111	127	105	96	122	922
<i>Total</i>	<i>1,416</i>	<i>1,265</i>	<i>1,237</i>	<i>1,308</i>	<i>1,306</i>	<i>1,379</i>	<i>1,275</i>	<i>9,186</i>

7. The map issued in the *Annual Report of the City Commissioner of Public Works*, 1915, showing the dates of land additions to the city emphasized the fact that Wards 2, 10, and 11, being the most recent and largest additions, offered most opportunity for growth.

In addition to the factors outlined above, the utilization of numerous other elements which foretell trend of population is desirable when data are available. Such additional factors may include: already planned and prospective street railway extensions; complete data from the municipal water supply and sewer departments outlining their future programs; the program for street paving, boulevarding, and extension of the park system; and changes both present and future in types of residence; for example, from single dwelling houses to modern city apartments.

The Location of Junior High Schools and High Schools

The extensive changes that are being introduced into the curriculum of the seventh, eighth, and ninth years of our public schools are necessitating a differentiation in housing and equipment for these years. Some progressive communities are already segregating the children of the junior high school in buildings especially equipped

TABLE XXIX
POPULATION OF ST. PAUL BY WARDS ²⁰

<i>Wards</i>	<i>Total population</i>	<i>Per square mile</i>
1	27,230	6,964
2	26,540	1,878
3	6,230	13,844
4	15,310	29,442
5	26,220	6,416
6	25,710	6,136
7	34,230	15,419
8	31,840	10,867
9	19,780	8,991
10	17,000	3,096
11	22,870	2,437
12	17,040	6,430
	270,000	4,870

²⁰ From 1915 report, City Commissioner of Public Works.

for this work and located with especial reference to the elementary school districts from which the junior high school obtains its pupils.

For the location of junior high schools consideration must be granted a number of highly important factors. In the smaller sized cities proximity to the senior high school is desirable in order to avoid duplication of equipment. In the larger cities it has been found possible to select natural land divisions in each of which the possible enrollment for the three years of the junior high school would suffice for a reasonably sized school. Eight such divisions were planned for St. Paul by the Survey Committee in 1917 with possible enrollments varying from 516 to 1,020 children. It was estimated that the enrollments of the majority of these schools would not exceed 1,200 in a period of ten years.

The method of location of proposed intermediate schools for Omaha is shown in Table XXXI. It was suggested that these schools be built in the order given in the table and that centralization with respect to all the elementary buildings named in each group should be a desirable criterion. Proximity to car lines was also considered essential for each site. In the determination of priority of construction certain standards prevailed, such as the elimination of sectional favoritism, the relief from present congestion of elementary schools in the order of their needs, the hope of

TABLE XXX

CHILDREN ATTENDING ELEMENTARY PUBLIC SCHOOLS

<i>Wards</i>	<i>1905-1906</i>	<i>1915-1916</i>	<i>Gain</i>	<i>Loss</i>	<i>Per cent</i>
1	4,856	4,265		591	- 12.2
2	2,615	2,543		72	- 2.8
3	1,350	991		359	- 26.6
4	1,100	938		162	- 14.7
5	3,783	3,380		403	- 10.7
6	3,365	3,581	216		+ 6.4
7	1,883	2,415	532		+ 28.3
8	3,069	2,684		385	- 12.5
9	1,017	683		334	- 32.8
10	1,366	2,512	1,146		+ 83.9
11	1,020	2,315	1,295		+127.0
12	1,181	1,358	177		+ 15.0

providing immediate assistance to certain types of homes in segregated sections where the practical education of the junior high school might be utilized in making the home more sanitary and habitable, and the need for parks and playgrounds. The 1933

TABLE XXXI
PROPOSED INTERMEDIATE SCHOOLS FOR OMAHA, NEBR.

<i>To be erected in the order named and centrally located to the schools of each group</i>		<i>Possible attendance from seventh, eighth and ninth grades in September, 1917</i>	<i>Estimated attendance in September, 1933</i>
First school	{ Providing for children from Long, Kelom, Cass, one-half of Lake. }	663	735
Second school	{ Providing for children from Vinton, Bancroft, Lincoln, Castelar, Comenius, Pacific, and Train. }	719	837
Third school	{ Providing for children from Central, two-thirds of Columbian, Farnam, one-half of Franklin, one-half of Saunders, Webster. }	690	692
Fourth school	{ Providing for children from one-half of Monmouth Park, Lothrop, Saratoga, one-half of Lake, Kennedy, and Druid Hill. }	816	1,255
Fifth school	{ Providing for children from Garfield, South Lincoln, South Central, Hawthorne, Jungmann, Madison, Brown Park. It is suggested that this school form the first three years of a six-year South High School, and be housed in the same building. }	618	671
Sixth school	{ Proposed for children from one-half of Farnam, Park, Mason, Windsor, one-third of Columbian. }	684	955
Seventh school	{ Providing for children from Lowell, South Franklin, Highland, West Side, Corrigan. }	324	439
Eighth school	{ Providing for children from Walnut, Hill, Clifton Hill, one-third of Franklin, one-half of Saunders and Dundee. }	475	805
Ninth school	{ Providing for children from Miller Park, Belvidere, Central Park, Sherman, and one-half of Monmouth Park. }	419	960

figures for Table XXXI were determined by utilizing the expected percentage of increase in total population of each school district of the city for the period 1917-1933. It was estimated that these grades would increase at approximately the same rate.

If any uniform practice has developed in the location of the senior high school in our smaller cities it has emphasized the idea of centrality alone without due regard to the advisability of securing a site adequate for extensions to the plant as well as for play purposes. Centrality of site frequently offers many obstacles to the proper location of the second and third high school as cities grow. It is obvious that such elements as environment, adequacy of site, opportunity for proper architectural setting, and proximity to street car lines, are far more important than centrality. The location of any new high school building involves such considerations as: the

TABLE XXXII

A COMPARISON BETWEEN LOCATION OF HIGH SCHOOL POPULATION AND CITY POPULATION OF OMAHA, NEBR.

Central High School and High School of Commerce only are included, and only that part of city population located north of F Street

<i>Population living</i>	<i>1917 city popu- lation</i>	<i>Percentage of city population involved</i>	<i>Percentage of high school population</i>		
			<i>Boys</i>	<i>Girls</i>	<i>Total</i>
1. Between Leavenworth and Cuming	40,173	27.6	27.6	27.0	27.3
2. North of Cuming, including Lake	24,701	17.0	20.1	20.8	20.5
3. North of Lake, including Pratt	11,021	7.6	11.2	11.1	11.1
4. North of Pratt, including Grand Avenue	12,733	8.8	8.0	8.8	8.5
5. North of Grand Avenue to North boundary	9,881	6.8	5.6	5.9	5.7
6. South of Leavenworth, including Center	18,828	12.9	15.2	14.6	14.9
7. South of Center, including Spring Street	17,754	12.2	8.4	8.6	8.5
8. South of Spring, including F Street	10,378	7.1	2.3	1.9	2.0
9. South of F to southern boundary			1.6	1.4	1.5
<i>Total city population involved</i>	<i>145,469</i>				

percentages of total school enrollment in high school over a period of years and comparisons with other cities of similar size; the withdrawals and eliminations from the elementary grades and high school by city land sections; and the distribution of the high school population over a period of four or five years according to the sections of the city in which the students live. A tabulation of the last-named factor for the one year 1916-1917 for the city of Omaha is given in Table XXXII. There is indication that the two high schools of the table have drawn equally well from all sections of the city for their student body. The falling off in sections 7 and 8 necessitates an explanation from the school authorities, though part of the difference may be due to the proximity of the South High School, which is not included in the tabulation.

PART II

STUDIES INVOLVING THE SCHOOL PLANT

THE MEASUREMENT OF THE BUILDING PLANT OF A SCHOOL SYSTEM

Any program for school buildings covering a period of years presupposes a complete detailed analysis of the existing school plant. Such an analysis involves, among other matters, a study of the life and types of existing buildings, their adequacy as measured with a building score card, their accessibility expressed in terms of distances travelled by the children attending, the present utilization and possible capacity of the buildings, and comparisons with the commonly accepted standards of school building construction.

The Life of the Existing School Plant

From studies made of the school plants of St. Paul, Minn., Omaha, Neb., and Paterson, N. J., Table XXXIII was constructed. Close inspection of this table brings to light certain clearly defined facts about these three school plants. The distribution is made after 1865 in five-year periods. In St. Paul the period of greatest activity in school construction seems to have been the decade 1885-1889, or, in a larger sense, 1880-1890. Seventy-five per cent of the elementary buildings found in St. Paul in 1917 had their origin previous to 1890. Eighty-five per cent were built previous to 1900, while forty-six per cent of additions were made previous to 1900. For comparison in building capacities the classroom is a desirable measure. Four hundred thirteen out of six hundred twenty-three classrooms, or sixty-six per cent of the elementary school housing in St. Paul, including additions, were constructed previous to 1890. In Omaha, it will be noted from Table XXXIII, 310 of 733 classrooms, or forty-two per cent, were built previous to 1900. In Paterson fully fifty per cent of the classrooms were constructed previous to 1900. These classrooms cannot be expected to meet the standards set up in modern classroom architecture. Wherein they lack greatly in meeting modern standards may be readily

pointed out through the use of such a scoring device as the Strayer Score Card for Measuring School Buildings. Too much stress cannot be placed upon the necessity for constantly bearing in mind the possibility of making old schoolrooms more habitable. Any school building program must necessarily include a program for modernization or rehabilitation of the older structures, in order that

TABLE XXXIII

DISTRIBUTION OF ELEMENTARY SCHOOL BUILDINGS ACCORDING TO YEARS OF ORIGINAL ERECTION AND YEARS WHEN ADDITIONS WERE MADE

Additions for two cities expressed in number of rooms

Years	Number of buildings erected					Number of buildings to which additions were made				
	St. Paul	Omaha		Paterson		St. Paul	Omaha		Paterson	
	Build-ings	Build-ings	Rooms	Build-ings	Rooms	Build-ings	Build-ings	Rooms	Build-ings	Rooms
Previous to 1865	2			1	12					
1865-1869										
1870-1874	2			3	42					
1875-1879	2			1	12					
1880-1884	10			2	22	6				
1885-1889	24	8	82	2	22	10			1	3
1890-1894	3	14	126	4	67		2	2		
1895-1899	2	9	86	4	52		4	14	1	8
1900-1904	4	5	79			6	5	14	3	34
1905-1909	1	5	57	4	74	7	10	45	1	4
1910-1914	2	6	66	2	58	4	8	48	1	22
1915-1917	1	6	66	1	41	2	18	48	1	14

children occupying them may be provided with advantages that are commensurate with those provided in the newer buildings.

Table XXXIII may well be supplemented with more detailed tables of the contrasts found in buildings erected in the early and later decades of the past fifty years. For instance, it seems quite obvious from this table that St. Paul's emphasis in educational matters had not been placed upon modern school construction during the past thirty years. During this same period there was added,

however, approximately fifty per cent of the present population of the city. A definite program for the supplanting of old structures by modern buildings seems desirable in every city. Schoolhouses like other houses in which people live become antiquated and uninhabitable. There no doubt comes a time when their use is actually a hindrance to the intellectual and social progress of a community. Before this point is reached it would seem the duty of school authorities to provide for their replacement.

School Buildings Classified According to Size

When school buildings are classified according to their size, as has been done for the school buildings of St. Paul and Paterson in Table XXXV, the school plant is again brought, as a whole, in review. Buildings with small numbers of rooms may be considered, as a rule, as lacking in equipment of special rooms, such as gymnasium, manual training, domestic science, library, and the like. Such buildings have also invariably a minimum of supervision and a relatively high cost of maintenance, while they lack in opportunities for the social mingling of children. A merit to be found in a good building program is the selection of sites so centralized that buildings with a small number of rooms are eliminated except in the more recently developing sections of a city.

A vital consideration when locating building sites is the reasonable maximum distance to be traversed by children going from home to school. Opinion will vary as to the distances that children of various ages may be required to walk. The unfortunate tendency in many cities has been to reduce the distances to an absurd minimum for the children. This has resulted in having eight, ten, and twelve-room buildings within three and four blocks of one another in many of our cities. Were one to draw circles about the small elementary schools of Omaha and St. Paul, using the schools as centers and a radius of three-eighths of a mile, the amount of overlapping would be astonishing in both cases. No better example could be found of the lack of planning for additions to school building plants. The distances that Superintendent Spaulding²¹ set up in Minneapolis as standard distances that children might be expected to cover in their daily trips to school have met with favor. These suggested standards are given below.

²¹ *A Million a Year*, Board of Education, Minneapolis, Minn., 1916.

TABLE XXXIV
DISTANCES FROM HOME TO SCHOOL

	<i>Maximum</i>	<i>Desirable</i>
For children of kindergarten and first six grades	Not more than one mile	Not more than three-quarters of a mile
For junior high school children	Not more than one and one-half miles	Not more than one mile
For high school children	Not more than two miles	Not more than one and one-half miles

If these standards are not too high in Minneapolis, where the winters are extremely severe, they should be readily accepted in the majority of our cities. It is quite possible that in warmer climates a slight increase in the figures given would not seriously inconvenience many children.

The classification of St. Paul's buildings shows forty-eight per cent of elementary buildings with eight classrooms or less, and sixty and two-thirds per cent with less than sixteen classrooms. Paterson's situation contrasts strikingly with no buildings of less than eight classrooms and with only thirty-three per cent of her buildings having sixteen classrooms or less.

TABLE XXXV
SIZES OF ELEMENTARY SCHOOLS IN TWO CITIES, ST. PAUL AND PATERSON,
ARRANGED ACCORDING TO NUMBER OF CLASSROOMS

<i>Type of building</i>	<i>St. Paul</i>		<i>Paterson</i>	
	<i>Number</i>	<i>Per cent</i>	<i>Number</i>	<i>Per cent</i>
1- 4 rooms	14	23		
5- 7 rooms	1	2		
8-11 rooms	18	30	2	8
12-15 rooms	11	18	6	25
16-19 rooms	14	23	5	21
20-23 rooms	2	3	3	13
24-27 rooms			3	13
28-31 rooms			2	8
32-36 rooms	1	2	2	8
Above 36 rooms			1	4
<i>Total</i>	61		24	

The following facts will bear out the statement made regarding the lack of special rooms in small buildings. Superintendents in twenty-eight cities generously coöperated in listing the number of regular classrooms for each of their school buildings as well as the types of special rooms provided. Capacity of special rooms was also given so that it was possible to eliminate any special rooms with a capacity of fifteen or less. Of the two hundred and twenty-one elementary buildings being used in these twenty-eight cities, seventeen per cent had sixteen or more regular classrooms. To this seventeen per cent of buildings was allotted thirty-eight per cent of all manual training rooms for the entire two hundred and twenty-one buildings, forty-five per cent of all domestic science rooms, seventy-five per cent of all gymnasiums, fifty per cent of all auditoriums, seventy-five per cent of all study halls, fifty per cent of all lunch rooms, twenty-six per cent of all libraries, and fifteen per cent of all play-rooms. The distribution of these special rooms in the entire two hundred and twenty-one buildings according to the size of buildings is given in Table XXXVI.

These same 221 buildings were distributed on the basis of the cost of janitorial service per pupil in average daily attendance in 1917 and the cost of principals' service per pupil in average daily attendance in 1917. The medians on each cost basis are given according to size of building in Table XXXVII. Because of the small number of buildings having more than twenty-eight rooms, the medians above that point were omitted.

The tendency toward a very definite lowering of costs on these two items as the number of rooms increases emphasizes the need for school-building planning which will eliminate the small building.

The Score Card Method of Measuring a School Plant

In determining the adequacy of any school plant it seems necessary to study every detail of construction and equipment in the light of the standards which are commonly being accepted to-day in the construction of school buildings. For the facilitation of such comparisons, the Strayer School Building Score Card ²² has been found to be particularly effective. This score card is constructed on the same plan as those utilized during past years in the work of

²² G. D. Strayer, *Score Card for City School Buildings*, Bureau of Publications, Teachers College, Columbia University, New York City.

TABLE XXXVI

RATIO BETWEEN NUMBER OF REGULAR CLASSROOMS AND SPECIAL CLASS-
ROOMS²² IN 221 ELEMENTARY SCHOOL BUILDINGS

Special Classrooms Provided

<i>School build- ings having regular class- rooms to the number of:</i>	<i>Manual training</i>	<i>Domes- tic Science</i>	<i>Gym- na- sium</i>	<i>Audi- torium</i>	<i>Play- room</i>	<i>Study hall</i>	<i>Lunch- room</i>	<i>Lib- rary</i>	<i>Number of school build- ings</i>
1					1				15
2					1				7
3	1								11
4	2		1	1	3				24
5	3	3					1		6
6	2	1		2 ²⁵					7
7	3	2		3	2			2	4
8	4	1			2		1	1	22
9	8	5	1 ²⁴	3	1			3	13
10	6	3	1	1	1				20
11	2	2	3	3	1	1		2	9
12	5	3		2	2		2	3	20
13	2			1				1	10
14	5	3		3	1			2	10
15	2	1			1		1		6
16	6	3	1	3	1		1	1	8
17	4	3	2	1			1	1	
18	6	3		2	1		1	1	8
19	1	1	1	1					1
20	2	1		2					4
21	3 ²⁶	2	3	4		2		1	5
22	2	2	2	3			1		3
25	1	1		1					1
26	2	1		1					2
30	1			1	1	1	1	1	1
<i>Total</i>	73	38	12	38	20	4	10	10	221

²² A room is considered to be a regular classroom when it is the home room for a group of pupils under a regular full-time teacher. Kindergarten rooms, first grade rooms, and second grade rooms are examples of regular classrooms.

²⁴ Also used as auditorium.

²⁵ Combined with playroom.

²⁶ Shops.

agricultural colleges. The decided advantage that follows from the use of the score card, on which are included nearly all the details that go to make up a perfect building, is that all such details are given separate consideration.

In utilizing the score card each of the eighty-eight main divisions of the score card is given separate consideration and a proportional allowance of the full possible score for that division. When the ratings of a number of school buildings, either in the same locality or in different communities are compared, the fact that the score card listings have necessitated that the same relative weight be given to similar items of construction or equipment in each building insures a degree of fairness and accuracy not obtainable under any other method now employed in judging school buildings.

The score card is accompanied with a set of detailed standards for each of the eighty-eight subdivisions, in the light of which the score for each item is obtained. A school building which meets all the standards set up in the score card is rated at 1,000 points. The score card has been utilized in the following school surveys: Nassau County, N. Y.; Framingham, Mass.; St. Paul, Minn.; Omaha, Neb.; Pelham, N. Y.; Great Neck, N. Y.; Paterson, N. J.; Binghamton, N. Y.;²⁷ and Utica, N. Y. In these intensive studies school

TABLE XXXVII

COSTS OF JANITORIAL SERVICE AND PRINCIPALS' SERVICE IN 220 SCHOOLS
OF 28 CITIES ON THE BASIS OF CHILD IN AVERAGE DAILY ATTENDANCE

<i>Buildings having</i>	<i>Number of cases</i>	<i>Median cost of janitorial service per child in average daily attendance</i>	<i>Median cost of principals' salary per child in average daily attendance</i>
1- 4 rooms	57	\$2.562	\$8.50
5- 8 rooms	39	3.000	5.06
9-12 rooms	62	2.464	3.75
13-16 rooms	34	2.107	3.05
17-20 rooms	17	2.131	2.94
21-24 rooms	8	1.675	2.40
25-28 rooms ²⁸	3	2.125	2.77

²⁷ Surveys of Binghamton and Utica made by the State Education Department, Albany, N. Y.

²⁸ Too few cases at this level.

buildings were found which rated as low as 274 points and as high as 927 points on the score card. Experience resulting from these applications of the score card, involving approximately 225 buildings, suggests that a score of 900-1,000 indicates a highly satisfactory degree of construction and equipment. In fact, in only a few minor respects does such a building deviate from acceptable standards. A rating between 700 and 900 points is fairly satisfactory. It should be studied in the light of its component parts. Slight building alterations, the need for which will be indicated by the low percentages of the possible maximal allowances on various of the eighty-eight subdivisions, will tend to raise considerably the score of a building of this group. A score of 600 to 700 points has meant, as experience in these surveys points out, that considerable alteration was needed before buildings could be brought to a satisfactory standard of efficiency. Buildings that have scored 500 to 600 points have proved to be highly unsatisfactory and yet not so far gone but that extensive repairs and replacements could make them reasonably habitable. When the scores of buildings have fallen below 500 points, it has been the universal judgment of those who have applied the score card that speedy abandonment of the building for school purposes was the only justifiable course to be followed. In all instances where scores of 500 or less have resulted, it has seemed that expenditures for repairs would be highly excessive. It has also seemed that there was little possibility, even with the expenditure of relatively large sums of money, to secure as a result of such repairs a building which was suitable for school purposes in the modern sense.

The scores that have been allotted in certain of the surveys mentioned are tabulated in Table XXXVIII. These scores may give a conception of the adequacy of school buildings as found in various types of cities.

An indication of the ease with which one may discover the points of defect in buildings which have been gauged with the score card may be seen by studying the final scores allotted to school buildings in Omaha in June 1917. These scores are given in Table XXXIX. The first eleven from an alphabetical list of the Omaha schools are included here. The maximum number of points possible for each of the five main divisions and the twenty-two major subdivisions of the score card is given in the first column. The scores as given

TABLE XXXVIII

SCORES ALLOTTED TO SCHOOL BUILDINGS IN FIVE SURVEYS BY
JUDGES USING THE STRAYER SCORE CARD

Elementary Schools

	<i>Nassau County</i>	<i>Framingham</i>	<i>St. Paul</i>	<i>Omaha</i>	<i>Paterson</i>
300 or below					
301-500	1	2	9	16	12
501-600	1	14	23	17	6
601-700	7	1	13	10	
701-800	12	1	3	8	3
801-900	13	1		1	3
901-1,000	5		1		1
<i>Total</i>	39	19	49	52	25

High Schools

300 or below				1	
301-500					
501-600	1			2	
601-700	1			1	
701-800	5	1	1		1
801-900	7		3		
901-1,000	1				
<i>Total</i>	15	1	4	4	1

by the judges for each of the items are listed under the names of the various schools. An inspection of the scores points out Cass and Clifton Hill as being particularly deficient in the item 'Site'; Belvidere and Clifton Hill as being judged as poor examples of housing from the standpoint of 'Internal and Gross Structure', while the Central Park and the Castelar are ranked as best of the list; that the service systems of five of the ten buildings rank particularly low; and that the classrooms of three buildings are rated high while seven buildings stand out as clearly lacking in special room facilities.

It must be understood that the final score as allotted on each subdivision in the table below is the composite of individual ratings by different judges. This composition of the ratings of a number

TABLE XXXIX

FINAL SCORES ON ELEVEN OMAHA SCHOOL BUILDINGS

<i>Names of buildings score card items</i>	<i>Maximum number of points possible</i>	<i>Bancroft</i>	<i>Beals</i>	<i>Belvidere</i>	<i>Brown Park</i>	<i>Cass</i>	<i>Castelar</i>	<i>Central</i>	<i>Central Park</i>	<i>Clifton Hill</i>	<i>Columbian</i>	<i>Comenius</i>
I Site	125	112	93	117	83	68	108	95	103	68	70	83
A. Location	55	45	35	50	40	30	50	50	45	45	40	45
B. Drainage	30	27	28	27	28	28	28	25	28	13	25	23
C. Size and form	40	40	30	40	15	10	30	20	30	10	5	15
II Building	165	144	119	68	96	105	149	120	151	49	94	96
A. Placement	25	25	22	10	20	15	22	22	22	17	15	18
B. Gross structure	60	59	41	21	38	46	59	43	59	18	36	36
C. Internal structure	80	60	56	37	38	44	68	55	70	14	43	42
III Service systems	280	159	153	81	104	106	179	94	190	54	147	103
A. Heating and ventilation	70	53	47	11	18	31	52	26	55	16	53	21
B. Fire protection	65	17	20	22	15	15	53	8	54	1	29	7
C. Cleaning system	20	11	12	7	12	12	9	9	13	9	12	12
D. Artificial lighting	20	9	10	5	7	4	9	8	11	4	9	12
E. Electric service	15	13	13	7	12	7	8	14	13	8	8	13
F. Water supply	30	6	6	5	10	6	7	4	7	4	8	8
G. Toilet facilities	50	43	39	14	23	24	34	18	30	5	21	23
H. Mechanical service	10	7	7	10	7	7	7	7	7	7	7	7
IV Classrooms	290	250	235	133	172	216	235	200	253	138	210	225
A. Location and connections	35	35	30	10	15	35	35	25	35	5	20	35
B. Construction and finish	95	80	75	53	63	68	85	58	85	47	72	67
C. Illumination	85	65	78	42	55	68	65	68	73	52	68	71
D. Cloakrooms and wardrobes	25	20	18	3	8	15	15	15	22	10	18	20
E. Equipment	50	50	34	25	31	30	35	34	38	24	32	32
V Special rooms	140	105	53	37	29	39	80	47	86	25	50	46
A. Special rooms for general use	65	50	21	17	7	7	30	5	35	5	8	5
B. Rooms for school officials	35	25	10	5		6	20	12	21		12	15
C. Other special service rooms	40	30	22	15	22	26	30	30	30	20	30	26
<i>Total</i>	<i>1,000</i>	<i>770</i>	<i>653</i>	<i>436</i>	<i>484</i>	<i>534</i>	<i>751</i>	<i>556</i>	<i>783</i>	<i>334</i>	<i>571</i>	<i>553</i>

of judges on each subdivision eliminates a single erratic score on any item. This method of scoring is an acknowledgment of the fact that the final rating cannot be considered as an absolute ranking, but that it merely tends to locate buildings within certain groups, i. e., to locate buildings in the 900-1,000 group, the 800-900 group, etc. The detailed method for securing the final score on buildings may be illustrated from Table XL, which gives the scores on each of two buildings as reckoned by five different judges. As a rule, three scores on each building will suffice for the final composite. In judging the Paterson, N. J., buildings in March, 1918, five judges scored each building. Each judge made his entire ratings without collusion with other judges. A high coefficient of correlation, $+ .98$ by the Pearson method, was found between the ratings of the buildings based on the composite scores as obtained from the first three scorings made for each building and the ratings based on the composite scores from the entire five scorings.

The agreement in the scores given by the five judges of Table XL is quite remarkable when it is borne in mind that each total and each sub-item represents the unbiased score of one individual. The final medians on the main items I, II, III, IV, and V are used to produce the final score on each building. The final median on any main item is the total of the medians on each literal sub-item. Thus erratic scores are eliminated.

Five judges, 'Hm', 'T', 'B', 'E', and 'Ha', rated each of these buildings. The individual ratings given by the judges on Building No. 1 were 436, 445, 443, 438, and 448. The composite and final rating was 437. In a similar manner, the five individual ratings that were recorded on Building No. 2 were 738, 735, 753, 728, 741, while the composite or final score was 744.

As Dr. Strayer points out in the score card:

It will be found particularly worth while to score old buildings, in order to call attention to the necessity for reconstruction which is always to be found in a city in which buildings have been in use over a considerable number of years. As one studies the problem of school buildings in the United States, he is impressed by the accidental or occasional repair or reconstruction which is provided. A careful study and scoring of buildings will often indicate common deficiencies of very great importance which should receive immediate attention, and others which are of relatively less significance which may

be postponed for a time. In the same school system it may be found as well that one building is so remarkably more deficient than another that it is manifestly good public policy to spend whatever money is available in recon-

TABLE XL
SCORES ON TWO PATERSON SCHOOL BUILDINGS AS RATED BY FIVE DIFFERENT JUDGES

Scorer's Initial	Hm	T	B	E	Ha	Median	Hm	T	B	E	Ha	Median
Item I	72	70	70	60	68		115	107	112	110	100	
A	40	35	35	30	33	35	50	47	47	48	45	47
B	27	25	30	25	30	27	30	30	30	30	30	30
C	5	10	5	5	5	5	35	30	35	32	25	32
						67						109
Item II	95	90	93	85	90		150	142	152	143	153	
A	20	14	15	17	21	17	22	20	22	20	22	22
B	35	38	35	30	38	35	58	51	56	53	57	56
C	40	38	43	38	31	38	70	71	74	70	74	71
						90						149
Item III	86	82	83	93	66		165	174	168	175	191	
A	17	15	14	34	21	17	44	52	47	51	55	51
B	16	15	20	13	8	15	32	29	42	45	55	42
C	13	13	11	8	12	12	17	17	14	12	15	15
D	4	6	10	6	5	6	15	15	16	15	12	15
E	6	5	6	5	4	5	10	11	5	11	12	11
F	3	7	3	7	4	4	11	10	8	8	10	10
G	22	16	19	20	12	19	31	40	36	26	29	31
H	5	5					5			7	3	3
						78						178
Item IV	137	155	162	165	162		269	268	277	254	251	
A	25	20	24	25	25	25	35	35	35	35	35	35
B	48	55	54	53	54	54	86	83	91	80	81	83
C	30	40	50	51	57	51	75	78	78	70	65	75
D	5	5		15		5	25	25	25	25	25	25
E	29	35	34	21	26	29	48	47	48	44	45	47
						164						265
Item V	46	48	35	35	62		39	44	44	46	46	
A	16	27	13	14	24	16	14	15	28	15	10	15
B	10	16	10	9	10	10	18	24	21	16	23	21
C	20	5	12	12	28	12	7	5	5	15	13	7
						38						43
Totals	436	445	443	438	448	437	738	735	753	728	741	744

Final score for first building, 437.

Final score for second building, 744.

structing the building which scores lowest before undertaking the work which may not be anything like so important in other buildings.

In the case of scoring school buildings, as with any other instrument of measurement, the result should suggest problems, and in some measure indicate the direction in which reforms are to be brought about. Any person using the score card should supplement the mere scoring of the several items with a report upon any notable deficiency which renders the building unfit for use. It is entirely conceivable that a building on most counts might stand high, but in some one particular, say, with respect to fire protection or sanitation, might rate extremely low. In this case, the notation after the building was scored would call attention to the fact that measures should be taken immediately to remedy particular defects, in which case the building would, possibly with a minimum of expense, be brought up to a very high standard of excellency.

Having secured the ratings for each school building in the manner indicated in the last table, it is possible that definite conclusions may be drawn from them for the purpose of providing this comprehensive

TABLE XLI.

GENERAL VIEW OF DEFICIENCIES POINTED OUT IN FOUR SCHOOL SYSTEMS
ON NINE IMPORTANT ITEMS OF THE STRAYER SCORE CARD

Range of percentages of the maximum scores possible	0-25 per cent					26-50 per cent					51-75 per cent					76-100 per cent				
	S.	P.	O.	F.	P.	S.	P.	O.	F.	P.	S.	P.	O.	F.	P.	S.	P.	O.	F.	P.
Gross structure	1 ²⁹		2	1		7	9	3	9		30	20	2	13		15	21	4	10	
Internal structure	1		6	1	3	15	12	5	7		26	25	1	7		11	9	3	9	
Heating and ventilating	3		8		5	36	24	1	13		11	8	3	4		3	12	6	4	
Fire protection	29		36	7	17	16	10	3	4		4	3	6	4		4	3		1	
Cleaning system			1		9	9	16	2	7		29	34	6	13		15	1	2	5	
Artificial lighting	28		17	5	12	16	22	1	6		8	13	3	4		1		1	4	
Water supply	24		28		13	22	28		10		4	2	1	3		1	10	2		
Toilet facilities	1		4		5	7	20	5	12		29	19	2	4		16	9	3	5	
Large rooms for general use	5		41	8	14	41	8		6		7	2	1	6			1	1		

Number of buildings—Omaha, 52; St. Paul, 53, Framingham, 10; Paterson, 26.

S. P.—St. Paul, Minn.

O.—Omaha, Nebr.

F.—Framingham, Mass.

P.—Paterson, N. J.

²⁹ Read: One building in St. Paul was allotted by the judges a score on gross structure which fell within the range 0-25 per cent of the maximum possible score on this item, etc.

bird's-eye view of the good qualities and faults of the entire school plant. Table XLI illustrates the tabulation that may be necessary for this purpose. The first step necessary in making this tabulation is the reduction to percentages of the maximum possible scores of each item of the score allowed by the judges. The percentages are then distributed under the ranges 0-25 per cent of efficiency, 26-50 per cent of efficiency, 51-75 per cent of efficiency, and 76-100 per cent of efficiency. Table XLI carries such a percentile distribution for four school systems and nine important items from the score card. The number of buildings found to fall under the various percentile ranges is given under the name of each of the four cities.

Table XLII repeats the preceding table except that the number of buildings under each percentile range has been expressed in terms of percentages of the total number of buildings studied in each system. This affords a better comparison between the systems included in the table.

Little difficulty is found in picking out from Tables XLI and XLII certain points of great deficiency in the school plants that have been measured. The items 'fire protection', 'artificial lighting', and 'water supply' seem to have fallen far below the standards set up in the score card. All four school plants are apparently almost entirely lacking in such large rooms as gymnasiums, auditoriums, playrooms, libraries, and the like, which are very essential for the development of the social nature of the child. It is clear that from a very careful inspection of a table of this sort, school authorities may readily pick out the deficiencies in their school plants which need stressing when the question of repairs and replacements arises. It would seem that the tendency of such a table would be to permit of equal consideration to all phases of the building needs and to prevent such ill-advised and unbalanced expenditures as might and do occur when no systematic plan of rehabilitation of school buildings is followed.

From a table giving the rankings of school buildings similar to those of Table XLIII, it is also possible to offset the influences of sectional politics when the razing of old buildings and the erection of new structures are matters of consideration. Table XLIII lists the school buildings of four cities by the final ratings given them on the Strayer Score Card according to the method described above. When replacements are being made it is quite obvious that the build-

TABLE XLII
DISTRIBUTION OF THE PERCENTAGES OF SCHOOL BUILDINGS IN THREE CITIES FALLING UNDER THE VARIOUS
PERCENTILE RANGES OF EFFICIENCY AS DETERMINED BY THE USE OF THE STRAYER SCORE CARD

Range of percentages of the maximum scores possible	0-25 per cent				26-50 per cent				51-75 per cent				76-100 per cent			
	S. P.	O.	F.	P.	S. P.	O.	F.	P.	S. P.	O.	F.	P.	S. P.	O.	F.	P.
Gross structure	1.9 ³⁰	3.8	10.0		13.2	17.3	30.0	11.5	56.6	38.5	20.0	50.0	28.3	40.4	40.0	38.4
Internal structure	1.9	11.5	10.0	11.5	28.3	23.1	50.0	26.9	49.1	48.1	10.0	26.9	20.7	17.3	30.0	34.7
Heating and ventilation	5.7	15.4		19.2	67.9	46.2	10.0	50.0	20.7	15.4	30.0	15.4	5.7	23.1	60.0	15.4
Fire protection	54.7	69.2	70.0	65.3	30.2	19.2	30.0	15.4	7.5	5.8		15.4	7.5	5.8		3.8
Cleaning system		1.9		3.8	16.9	30.8	20.0	26.9	54.7	65.4	60.0	50.0	28.3	1.9	20.0	19.2
Artificial lighting	52.8	32.7	50.0	46.2	30.2	42.3	10.0	23.1	15.1	25.0	30.0	15.4	1.9		10.0	15.4
Water supply	45.3	53.8		50.0	41.5	40.4		38.4	7.5	3.8		3.8	5.7	1.9	100.0	7.7
Toilet facilities	1.9	7.7		19.2	13.2	38.5	50.0	46.2	54.7	36.5	20.0	15.4	30.2	17.3	30.0	19.2
Large rooms for general use	9.4	78.8	80.0	53.8	77.4	15.4		23.1	13.2	3.8	10.0	23.1		1.9	10.0	

NOTE. The figures in the body of this table are percentages of the total number of school buildings studied in each city.

³⁰ Read: 1.9 per cent of St. Paul's buildings was allotted by the judges a score on gross structure which fell within the range 0-25 per cent of the maximum possible score on this item.

ings ranking low according to this impartial method of selection are those which should first be supplanted. The procedure recommended in the cases of St. Paul and Omaha was approximately the rapid abandonment and replacement of the buildings below 500, beginning with the lowest ratings; the adoption of a definite program of modernization for the 601-900 buildings, which might be expected to make all these buildings conform with reasonable degree to the standards set up; provision for the more vital needs in the 501-600 class without the definite hope of ever making these buildings completely satisfactory but with the aim of having them at least conform to the standards which involved the questions of safety, sanitation, and health.

Supplementing the Score Card

In studying a school plant in order to supplement the scoring done by means of the Strayer Score Card, detailed studies of the entire situation in respect to playgrounds, building economy, classroom lighting, special room equipment, lavatory facilities, fire protection equipment, and the like, should be made. These studies may involve comparisons with situations as found to exist in other cities, as well as contrasts with the more commonly accepted standards.

The School Playgrounds

Measurement of the playgrounds provided by a school system in terms of the percentages of schools and school children provided with the various allotments of playground area per child has been a form frequently used in surveys. The enrollment of children in the schools is frequently taken as one of the factors in this computation. Where the future building program is being considered, it seems that the pupil capacity of buildings is a more equitable basis than enrollment, except in such cases where the enrollment is found to exceed what should be considered to be the capacity of the plant. It is reasonable to expect that any changes that are to be made in playgrounds after the assembling of data should be considered from the viewpoint of the total number of children who might be expected at any time or other to attend the schools in question.

Table XLIV shows the situation as it has been found to exist in six cities on the basis of children enrolled at the time the studies were made.

TABLE XLIII: THE SCHOOL BUILDINGS OF FOUR CITIES ARRANGED ACCORDING TO RATINGS ALLOTTED THEM ON THE STRAYER SCORE CARD

	<i>St. Paul</i>		<i>Omaha</i>		<i>Framingham</i>		<i>Paterson</i>	
1	Lafayette	313	H. S. of Commerce	274	Lincoln Grammar	390	No. 2	318
2	Jefferson	358	Central Benson	308	Lincoln Primary	485	No. 25	319
3	Monroe	404	Druid Hill	313	Washington Street	503	No. 6	376
4	Adams	409	Park	334	Apple Street	503	No. 7	376
5	Jackson	427	Clifton Hill	334	Saxonville Grammar	594	No. 11	391
6	Franklin	452	Dupont	343	Hollis	600	No. 8	425
7	Webster	491	Kellom	408	Franklin	605	No. 1	437
8	Rice	500	Train	412	Lawrence	703	No. 13	444
9	Crowley	500	Sherman	413	High school	764	No. 4	450
10	Lincoln	511	Fort	422	Maynard	876	No. 16	470
11	Hendricks	516	Florence	425			No. 5	477
12	Irving	521	Belvidere	436			No. 15	497
13	Murray	524	Old Long	439			No. 18	519
14	Cleveland	530	Walnut Hill	454			No. 19	528
15	Edison	531	Saratoga	470			No. 14	548
16	McClellan	535	Brown Park	484			No. 17	552
17	Maxfield	538	Farnam	495			No. 20	589
18	Neill	538	Mason	505			No. 3	591
19	Hancock	541	Lowell	514			No. 9	703
20	Drew	543	Lake	515			No. 23	744
21	Sibley	549	Cass	534			No. 26 H. S.	763
22	Gorman	550	Pacific	537			No. 12	775
23	Ericsson	558	Monmouth Park	539			No. 22	820
24	Madison	563	Corrigan	552			No. 24	829
25	Van Buren	569	Comenius	553			No. 21	847
26	Hawthorne	573	Lincoln	556			No. 10	919
27	Garfield	576	Central	556				
28	Douglas	580	Webster	558				
29	Davis	582	South Lincoln	559				
30	Scheffer	582	West Side	561				
31	Longfellow	586	New Long	561				
32	Washington	587	Benson High	565				
33	Harrison	607	Columbian	571				
34	Deane	608	Madison	586				
35	Smith	613	Highland	587				
36	Whittier	613	South High	597				
37	Sheridan	615	Windsor	601				
38	Grant	617	Saunders	615				
39	Ramsey	627	Franklin	618				
40	Tilden	627	Hawthorne	619				
41	Baker	643	Central High	621				
42	Hill	661	Garfield	628				
43	Galtier	681	Lothrop	646				
44	Phalen Park	687	Rosehill	648				
45	McKinley	700	Beals	653				
46	Mound Park	710	Jungman	655				
47	Gordon	712	South Central	672				
48	Ames	792	Miller Park	730				
49	Mech. Arts. H.S.	793	South Franklin	739				
50	Humboldt H.S.	805	Vinton	743				
51	Central H.S.	809	Castelar	751				
52	Johnson H.S.	811	Bancroft	770				
53	Finch	927	Central Park	783				
54			Kennedy	787				
55			Rosewater	796				
56			Dundee	817				

TABLE XLIV
THE PLAYGROUNDS OF SIX CITIES

<i>Percentages of school children enrolled who were allotted</i>	<i>30 sq. ft. or less</i>	<i>30-100 sq. ft.</i>	<i>100 sq. ft. or less</i>	<i>100-200 sq. ft.</i>	<i>200 sq. ft. or over</i>
St. Paul, February, 1917 ²¹	29.1	56.1	85.2	9.9	4.9
Denver, 1916 ²²			82.0	12.5	5.5
Salt Lake City, June, 1915 ²³			37.0	32.0	31.0
Milwaukee, March, 1916 ²⁴	39.3	49.7	89.0	9.5	1.5
Omaha, June, 1917 ²⁵	9.0	49.0	58.0	32.0	11.0
Paterson, March, 1918 ²⁶	78.8	21.2	100.0		

<i>Playgrounds ²⁷ showing</i>	<i>Lowest number of square feet per child</i>	<i>Median number of square feet per child</i>	<i>Highest number of square feet per child</i>
St. Paul	4 sq. ft.	60 sq. ft.	1,889 sq. ft.
Denver	40 sq. ft.	130 sq. ft.	1,037 sq. ft.
Salt Lake City	4.1 sq. ft.	62 sq. ft.	2,560 sq. ft.
Omaha	23 sq. ft.	97.3 sq. ft.	964 sq. ft.
Milwaukee	8 sq. ft.	38.9 sq. ft.	598 sq. ft.
Paterson	.4 sq. ft.	15.2 sq. ft.	49.4 sq. ft.

The following quotations from recent school surveys will indicate the disregard for any standard in providing adequate playgrounds in some of our larger cities.

Considering the fact that Denver has grown to its present size mainly within the last three or four decades, it is astonishing to find such a large proportion of cramped school grounds. In a very old city one expects to find schools without adequate playgrounds. That thousands of school children in Denver should be deprived of room for wholesome recreation can only

²¹ *St. Paul Survey*, Commissioner of Education, St. Paul, Minn.

²² *Denver Survey*, Board of Education, Denver, Colo.

²³ *School Organization and Administration*, World Book Co., Yonkers, N. Y.

²⁴ *Milwaukee Building Survey*, Board of Education, Milwaukee, Wis.

²⁵ *Omaha Building Survey*, Omaha, Neb. (not published).

²⁶ *Paterson Survey*, Paterson, N. J. (in press).

²⁷ Dates as above.

be explained by the short-sighted policy of her earlier school boards.—*Denver Survey*.

Nowhere else in the school system is forethought more important than in the selection of well-located and ample sites, in anticipation of future needs. Blessings or tragedy hang upon the choice. Some of the cramped sites listed above could not now be enlarged except at prohibitive cost. In the case of others, additions are still feasible and ought to be made at the earliest possible moment.—*Salt Lake City Survey*.

The problems involved are much more difficult than appears at first thought. Cleveland has shown wise generosity in purchasing large plots of ground for schools even where land is very expensive. Nevertheless, the area is never large enough to provide all the playground space that could be desired and at the same time ample space for landscape gardening. The problems have been met by setting aside most of the space for the children's use and providing a suitable surfacing for the playgrounds.—*Cleveland Survey*.

It is unfortunate that the school sites which have heretofore been purchased have been so small.—*Butte Survey*.

The school lots for nearly all the school buildings in the city are too small. This deficiency is partly due to the fact that the regulation block of Portland is much smaller than that in most cities, and, instead of insisting on two or four blocks and condemning the inclosed streets, the Board of School Directors has in the past been compelled, either from lack of money or lack of the support of public opinion, or both, to depend often on a single block, sometimes less, for school lots.—*Portland Survey*.

Apparently the failure to provide adequate playgrounds seems to have been a common oversight on the part of those who have been entrusted with the purchase of school sites. Part of this failure may be due to the great diversity in opinion regarding what the minimum allowance in square feet per child should actually be. It is recognized that schools administered on a work-study-play program, which provides for a constant use of the playground, need smaller allowances per child of enrollment, as only a proportion of the children are required to be on the playground at one time.

The following are minimum allowances that have been set up by students of the playground problem, or that have been accepted by local authorities as desirable for their communities.

Terman: Denver Survey	100 square feet for child enrolled.
Jones: Rockford, 1915-1916 Report . . .	100 square feet per capita.
Terman: Salt Lake City Survey	200 square feet for each child in cities no more crowded than Salt Lake City.

Strayer: Building Score Card	100 square feet per child of possible enrollment.
Strayer: Building Score Card	5-12 acres for high school and junior high school.
Strayer: Score Card for Rural School Plant	3 acres.
Ayres: Cleveland Survey	35 to 50 square feet for each child is a fair allowance. 50-60 good, 65 and above very good.
Spaulding: Minneapolis, <i>A Million a Year</i>	40-50 square feet per pupil of building capacity. 40 pupils to the room is fair, 50-100 is good.
Strayer, Engelhardt, and Hart: Omaha Survey	100 square feet per child of maximum enrollment.
Cubberley: Portland Survey	51 square feet free space per pupil insufficient. 40,000 square feet (a typical Portland city block) too meagre for ordinary city school lot.
Harbach and Hart: Milwaukee 10-year building program	30 square feet insufficient but a minimum sought for 20 schools which were below this amount in March, 1916.
Bobbitt: Grand Rapids Survey	100 square feet per child in average daily attendance.
Schoolhouse Department, Report, 1913-1914, Boston	Approximately 30 square feet per child.
Department of Education, Minnesota	50 square feet per pupil as a minimum, 100 square feet desirable (presumably of capacity enrollment).
Curtis: <i>Reorganized School Playground</i> , United States Bureau of Education, Bulletin No. 40, 1913	10 acres for a city high school.
Curtis: <i>Reorganized School Playground</i> , United States Bureau of Education, Bulletin No. 40, 1913	Each school should have one block of ground in most cities. (Two acre blocks insufficient).
Toronto Playground Association	An acre for each 150 children as a minimum for effective play.

Mr. Rowland Haynes, in making a recreation survey of Milwaukee, decided that 300 was the number of children who could play to advantage on an acre. Thirty square feet per child, the minimum set down by the English Board of Education, allows only room

enough for children to stand and swing their arms about, but pupils are taken to large playing fields for athletic games needing more space. Mr. Haynes found that 120 children per acre can play basketball, and that 200 per acre can play indoor baseball. Averaging these as typical active games requiring a small amount of space, and filling in the chinks with ring games which occupy less space, the figure of 300 children per acre was reached. It was felt, however, that even this figure of 300 per acre was a high saturation point for play space. With more than that figure some of the children must stand around, crowded out of a chance to join in the fun.

In *Mind and Body* of January, 1915, Mr. William A. Stecher outlined the space needed for school games and the areas desirable for various types of schools as indicated below:

1. Ring games (Cat and Mouse type). Circle 20 feet—for 30-40 players. Square needed 25 x 25-625 feet; 18 square feet per player.
2. Tag-games. Field needed 35 x 40 feet—for 30-40 players. 1,400 square feet; 40 square feet per player.
3. Play-apparatus, like Giant Strides, Swings, Ladders, Bars, etc., employ 15-20 players. These need about 700 square feet; 40 square feet per player.
4. Dodge-ball. Circle 40 feet for 30-40 players. Square needed 45 x 45-2,000 square feet; 50 square feet per player.
5. Volley-ball. Court 25 x 50 feet for 20 players. Oblong needed 30 x 55-1,650 square feet; 80 square feet per player.
6. Captain ball. Court 30 x 60 feet for 20 players. Oblong space needed 35 x 65 feet-2,275 square feet; 113 square feet per player.
7. Playground-ball. Court 60 x 70 feet for 20 players. Oblong needed 65 x 75-4,900 square feet; 245 square feet per player.
8. Basketball. Court 40 x 70 feet for 10 players. Oblong needed 55 x 75-4,000 square feet; 400 square feet per player.
9. Football. Field 160 x 330 feet for 22 players. 52,800 square feet; 2,400 square feet per player.
10. Baseball. Field 250 x 250 feet for 18 players. 62,500 square feet; 3,472 square feet per player.

1. *A recess in a primary school* that brings 8 rooms of 45 pupils into the yard (360 pupils).

Two-thirds of the children play, one-third stand or simply move about; that is, 240 are active players and 120 are non-players.

Of the players one-third play ring-games, one-third tag-games, and one-third ball games of the dodge-ball type. The play space needed for these

three types of activity would average 36 square feet per player. This would mean 8,640 square feet for 240 players.

For the non-players a space 3 x 3 feet—9 square feet would be needed. This would mean an additional 1,080 square feet.

Total minimum unobstructed play space for 360 pupils would be 9,720 square feet; say, 27 square feet per primary pupil.

The space, therefore, for a primary school of 360 pupils should be no less than 100 x 100 feet. If such play-space were to be used by older children or by more children during the summer time, the area would be insufficient.

2. *A recess in a grammar school* that brings 8 rooms of 40 pupils into the yard (320 pupils).

It would be assumed that as in the primary grades two-thirds play and the rest walk or stand about.

If one-fourth of the players play tag-games, one-fourth use some of the apparatus located in the yards, one-fourth play ball games like dodge-ball, and one-fourth play ball games like volley-ball, these four types of activity would average $52\frac{1}{2}$ square feet per player. If basketball were one of the games, the space needed would be at least 100 square feet per player. This would mean 214 grammar pupils need 11,235 square feet of play space. For the non-players a space of 3 x 5—15 square feet would make an additional 1,590 square feet, giving a total of 12,825 square feet—40 square feet per grammar pupil.

The unobstructed play space for a school bringing 320 grammar pupils into the yard to play should be no less than 100 x 130 feet. If games like basketball, or modified forms of play-ground ball are to be played by part of the pupils, the area should be at least 100 x 350 feet for each 320 pupils, that is, 110 square feet per grammar pupil.

Keeping in mind the foregoing standards which have been found acceptable to students of the playground problem, it does not seem unreasonable to ask boards of education to adopt a policy of gradually increasing the allotments of playground area per child of maximum building capacity in elementary schools until no school has less than fifty square feet per child, with the ultimate aim of providing one hundred square feet per child. Coupled with this program should be a policy of purchasing sufficiently adequate and properly located sites in newly developing sections of the city before the price of land has become excessive.

It is recognized that in many of our cities where the density of population is relatively small, there will be comparatively little difficulty in securing sufficient land to meet the minimal standards

designated above. In cities with comparatively small areas and relatively large density of population, the problem of meeting the suggested standards becomes more difficult. The city of Paterson, N. J., falls in this second group. With a population of approximately 125,000 people, this city covers an area of only a trifle more than six square miles. Only meagre attempts were made to provide school sites sufficiently large to meet the playground needs when additions to buildings became necessary. Even on the outskirts of the city, where unoccupied land is at present available, the school buildings occupy the larger part of the school grounds. Purchases of land in these latter cases to the extent of whole city blocks may be made at present at fairly reasonable prices. These conditions are duplicated in many other of our American cities. It is safe to assume that greater and greater demand for more adequate playground facilities will be made on boards of education as years pass.

It no doubt would be a far-sighted policy on the part of school boards to begin early in bringing their situations up to the proposed standards. In making extensions to school grounds, the following elements must be considered.

1. The desirability of the use of the present grounds for school purposes: environment, accessibility, present and future proximity to annoyances, unsanitary or undesirable conditions.
2. The type of school building, its adaptability to future school needs, the possibility of modernization, or the need for abandonment.
3. The possibility of the elimination of small buildings with centralization in buildings where better facilities may be concentrated.
4. The changes in school enrollment in a building must be noted as a gradual decrease may eliminate the need for extensions to grounds.
5. Coöperation with other civic organizations should be established whereby city playgrounds are placed in close proximity to school buildings, thus preventing a duplication of playground provisions.
6. Plans should provide for adequate playgrounds in connection with all buildings. Where land costs are prohibitive, playgrounds, provided even at a short distance from the schools themselves, could be utilized.

7. High school playgrounds will preferably be located in immediate vicinity of the school building. Duplication of dressing and bathing facilities will in such cases not be necessary. The probabilities are that compulsory military drill will form a part of all future high school programs. This further stresses the need for an adequate athletic or drill field.

TABLE XLV
LAND NEEDED TO BRING ALL SCHOOL GROUNDS UP TO THIRTY SQUARE FEET PER CHILD TEN YEARS HENCE IN MILWAUKEE, WIS., 1916³⁸

<i>School</i>	<i>Estimated enrollment 10 years hence</i>	<i>30 sq. ft. per child</i>	<i>Present area</i>	<i>Net amount needed to meet the 30 sq. ft. standard</i>	<i>Additional amount needed to meet the 50 sq. ft. standard</i>
Detroit	800	24,000	7,300	16,700	16,000
Ninth	1,200	36,000	16,620	19,380	24,000
Bartlett	635	19,050	12,080	6,970	12,700
Eighteenth Avenue	1,200	36,000	21,680	14,320	24,000
Jefferson	652	19,560	12,500	7,060	13,040
Second	590	17,700	13,210	4,490	11,800
Dover	990	29,700	21,840	7,860	19,800
Twentieth Street	750	22,500	17,300	5,200	15,000
Ring	1,090	32,700	25,000	7,700	21,800
Eighth Street	650	19,500	15,500	4,000	13,000
Island	670	20,100	16,700	3,400	13,400
Mineral	764	22,920	17,830	5,090	15,280
Brown	880	26,400	21,930	4,470	17,600
Walker	435	13,050	9,805	3,245	8,700
Prairie	700	21,000	17,050	3,950	14,000
Twenty-first Street	891	26,730	21,930	4,800	17,820
Fifth Street	765	22,950	19,930	3,020	15,300
Sixteenth Avenue	1,050	31,500	25,700	5,800	21,000
Windlake	900	27,000	28,000		18,000
Fourteenth Street	950	28,500	27,100	1,400	19,000
<i>Totals</i>	<i>16,562</i>	<i>496,860</i>	<i>369,005</i>	<i>128,855</i>	<i>330,240</i>

Total number needed for 50 sq. ft. standard—459,095 sq. ft.

³⁸ Survey of Milwaukee School Buildings and Sites, 1916.

In presenting the needs for additional playground areas in Milwaukee in 1916, the survey committee utilized the very acceptable tabulation of Table XLV in showing the amounts of land needed to bring some particularly inadequate playgrounds up to the standard of thirty as well as fifty square feet per pupil of the estimated enrollment for ten years hence.

Economy in School Building Planning

In the formation of judgments regarding the efficiency of a school plant, the elements of economy of planning and the percentile allotments of space for the various educational activities should be given great consideration. The Committee on Standardization of School Buildings of the Department of Educational Administration of the N. E. A. has determined for fifty-four school buildings the percentages of floor areas that have been devoted to the various purposes for which space is provided in school buildings. The percentages under the five major purposes, administration, instruction, social activities, general use, and construction, as distributed for twenty elementary schools, twenty-one high schools, four technical high schools, and nine junior high schools, are shown in Table XLVI. These buildings are representative of types that are being constructed in various parts of the United States. They represent the plans of various architects.

The wide variations in the percentages of space found to have been devoted to each of these major purposes indicate the need for the full consideration of such percentages in the measurement of a school plant as well as in the planning of new structures. The middle fifty per cent for each item may be considered a fair range for purposes of comparison. That high percentages of space are desirable for instructional and social activities, low percentages for construction, and reasonable percentages for administration and general purposes, will be admitted.

Table XLVII shows a distribution of the percentages of floor area in each set of schools mentioned on the basis of educational and social activities combined. Such a wide range as is shown in the grade school column, where are found 82.5 per cent at one extreme, and 32.5 per cent at the other extreme of the distribution, indicates the need for a careful consideration of the complete ultimate utilization of a building before building plans are approved.

TABLE XLVI

PERCENTAGES OF ENTIRE FLOOR AREAS DEVOTED TO VARIOUS PURPOSES

In twenty elementary, twenty-one high, four technical high, and nine junior high schools

Grade schools					Academic high schools				
Admin- istration	Instruc- tion	Social activi- ties	General	Con- struc- tion	Admin- istration	Instruc- tion	Social activi- ties	General	Con- struc- tion
36.65	54.17	24.53	43.03	12.58	17.935	48.18	30.69	29.76	13.40
22.60	49.70	23.06	27.70	12.58	17.66	47.907	27.723	26.82	12.37
20.65	49.67	22.21	27.437	12.093	17.64	44.07	27.07	25.37	12.10
20.43	48.29	21.00	26.663	11.57	16.64	42.50	25.45	24.99	10.93
20.21	47.16	19.57	24.01	11.18	16.34	41.964	24.88	24.29	10.91
19.77	44.60	19.49	23.69	10.97	16.01	40.667	23.88	24.08	10.821
19.45	44.60	18.16	22.36	10.83	15.67	39.88	23.42	24.06	10.70
18.43	44.43	14.809	22.34	10.71	15.58	35.52	22.25	23.96	10.69
17.68	42.97	14.44	22.16	10.27	15.48	34.98	22.14	23.64	10.55
17.66	40.57	13.86	21.13	10.26	13.75	34.52	20.13	22.288	10.44
16.84	40.48	13.45	20.80	10.09	13.74	34.08	19.097	21.74	10.22
15.64	38.34	12.37	19.77	9.08	12.99	33.34	18.43	21.441	10.15
15.37	38.305	11.97	18.83	8.30	12.63	32.84	18.25	20.51	9.83
13.86	37.702	9.463	16.53	8.07	12.17	31.98	17.75	19.61	9.75
13.045	37.31	6.46	16.50	8.07	11.79	31.119	17.61	19.34	9.58
12.82	36.65	6.33	13.67	7.776	11.449	30.58	16.61	18.315	8.89
12.67	36.40	5.64	11.66	7.44	10.87	30.33	14.14	18.30	8.67
10.75	33.48		11.16	7.42	10.67	29.70	13.73	18.00	8.59
10.39	27.77		10.33	7.36	9.50	28.37	13.608	17.604	8.161
9.41	26.09		10.13	5.69	9.37	27.64	9.42	17.19	7.44
					7.216	25.57	.46	14.14	7.04
17.25 ³⁹	40.525	13.652	20.965	10.175	13.745	34.30	19.613	22.014	10.33
19.99 ⁴⁰	46.52	45.88	23.85	11.075	16.007	40.70	24.197	24.098	10.786
12.932 ⁴¹	36.980	6.362	15.085	7.923	11.275	30.512	16.076	18.437	9.121

³⁹ Median.⁴⁰ Seventy-five percentile.⁴¹ Twenty-five percentile.

NOTE. Under Administration are included offices, faculty rooms, janitor's quarters, clinics, wardrobes, storage, toilets, boiler, coal and fan rooms, and elevators.

Under Instruction are included classrooms, laboratories, manual training and domestic science rooms, music and art studios, study halls, shops, and libraries.

Under Social Activities are included assembly halls, gymnasium, recreation rooms and lunchrooms.

Under General Purposes are classified stairways, corridors, flues, vestibules, and dead space.

Under Construction are included interior and exterior walls.

TABLE XLVI—(Continued)

<i>Technical high schools</i>					<i>Junior high schools</i>				
<i>Admin- istration</i>	<i>Instruc- tion</i>	<i>Social activi- ties</i>	<i>General</i>	<i>Con- struc- tion</i>	<i>Admin- istra- tion</i>	<i>Instruc- tion</i>	<i>Social activi- ties</i>	<i>General</i>	<i>Con- struc- tion</i>
24.82	43.94	22.13	24.20	14.14	21.78	44.91	27.61	27.72	12.92
19.41	37.73	20.357	23.453	11.06	18.25	43.75	20.11	21.55	10.95
12.083	35.109	20.11	17.10	9.62	17.74	43.37	18.52	21.25	9.35
7.69	34.92	17.48	15.81	9.57	16.32	42.88	18.01	20.88	8.69
					15.56	41.11	15.84	20.56	8.21
					15.35	40.29	14.82	20.24	7.79
					11.25	36.52	12.97	19.73	6.94
					10.86	32.59	11.95	14.42	6.71
					9.95	32.11	8.07	13.85	6.68
15.746 ⁴²	36.419	20.233	20.276	10.34	15.56	41.11	15.84	20.56	8.21
22.115 ⁴³	40.835	21.243	23.826	12.60	17.753	43.451	18.80	21.06	9.585
9.886 ⁴⁴	35.014	18.795	16.455	9.595	11.616	35.517	12.818	17.03	6.96

⁴² Median.⁴³ Seventy-five percentile.⁴⁴ Twenty-five percentile.

NOTE. Under administration are included offices, faculty rooms, janitor's quarters clinics, wardrobes, storage, toilets, boiler, coal and fan rooms, and elevators.

Under Instruction are included classrooms, laboratories, manual training and domestic science rooms, music and art studios, study halls, shops, and libraries.

Under Social Activities are included assembly halls, gymnasium, recreation rooms, and lunchrooms.

Under General Purposes are classified stairways, corridors, flues, vestibules, and dead space.

Under Construction are included interior and exterior walls.

TABLE XLVII

PERCENTAGES OF ENTIRE FLOOR AREAS IN FIFTY-FOUR SCHOOL BUILDINGS
DEVOTED TO INSTRUCTIONAL AND SOCIAL ACTIVITIES COMBINED

<i>Grade Schools</i>	<i>High Schools</i>	<i>Technical H. S.</i>	<i>Junior H. S.</i>
82.511	67.95	64.05	61.89
66.64	67.104	57.05	61.76
65.31	58.842	55.466	60.20
61.57	58.33	55.21	56.63
58.43	57.80		55.11
58.05	57.49		54.83
57.81	56.77		54.08
56.97	56.71		52.98
55.97	55.86		47.95
55.94	54.275		
55.83	54.00		
54.17	53.27		
51.75	53.25		
50.83	52.97		
49.70	51.59		
48.62	51.59		
48.29	51.384		
47.768	48.76		
46.12	48.64		
32.55	48.22		
	47.71		
<i>Median</i> 55.885	54.00	56.258	55.11
<i>75 percentile</i> 58.24	57.725	60.55	57.522
<i>25 percentile</i> 49.16	51.435	55.338	53.255

Full consideration given the question of economy of school planning should prevent much useless expenditure for fuel, maintenance, and janitorial service. With constantly increasing school costs, such savings are of the utmost importance. That extremely wide variations in such costs may be found in school systems is amply illustrated from the situation found to exist in the schools of St. Paul in 1913-1916.⁴⁵ The ranges, both on the basis of each pupil in average daily attendance and of each 1,000 cubic feet of classroom space, as given in Table XLVIII, indicate disparities within a school system, the avoidance of which is desirable in future construction.

⁴⁵ *St. Paul Survey*, 1917, pp. 127 ff.

A School Building Program for Cities

TABLE XLVIII

COST OF FUEL IN ST. PAUL, MINN., AVERAGE FOR THE FOUR YEARS, 1913-1916

<i>Per pupil in average daily attendance</i>		<i>Per 1000 cubic feet classroom space</i>	
<i>Average per building</i>	<i>Number of buildings</i>	<i>Average per building</i>	<i>Number of buildings</i>
\$0.73-\$0.99	4	\$3.00-\$3.99	6
1.00- 1.24	15	4.00- 4.99	18
1.25- 1.49	11	5.00- 5.99	7
1.50- 1.74	6	6.00- 6.99	6
1.75- 1.99	5	7.00- 7.99	5
2.00- 2.24	1	8.00- 8.99	2
2.25- 2.49	1	9.00- 9.99	3
2.50- 2.74	3	10.00 and over	4
2.75- 2.99	1		
Over 3.00	4	<i>Total</i>	51
<i>Total</i>	51		

The Measurement of Classroom Facilities

When one considers the extreme importance to the child of classrooms that are properly lighted, of such a size as to give the child the maximum of opportunity for profiting from his school work, and so equipped as to eliminate all obstacles to this same end, the persistence of boards of education in building and equipping classrooms which fail to conform with accepted standards, and the omission of any program for modernization of especially defective classrooms, appear criminal. Among students of educational needs considerable unanimity of opinion prevails concerning the desirable dimensions, lighting, and equipment of elementary classrooms. The degree of agreement on the size of elementary classrooms is evident in Table XLIX.

The situation in respect to the minimum per pupil allowance in floor area and air space, as it appears on the statute books of several states, is shown in Table L.

From the above proposed standards it may be seen that the acceptable classroom may vary in its dimensions from 23 x 28 to 24 x 32 feet, with a height of 12 to 12½ feet. Such a room should accommodate not more than 40 children. The situations found to

TABLE XLIX

DIMENSIONS OF ELEMENTARY CLASSROOMS ACCEPTABLE TO VARIOUS
AUTHORITIES

<i>Authority</i>	<i>Width feet</i>	<i>Length feet</i>	<i>Height feet</i>
Portland, Oregon, Survey	23 or 24	30	Not more than 12 ½
Butte, Montana, Survey	23	30	Not more than 12 to 13
Salt Lake City, Survey			
Best	22	28	12
Permissible	24	32	13
St. Paul, Minnesota, Survey			
Minimum	23	28	12
Maximum	24	32	12
Dresslar's <i>American Schoolhouses</i>	24	32	12 ½
North Dakota state law			12 at least
New Jersey state law			12 at least
Ohio state law			At least ¼ width of room

TABLE L

MINIMAL PER PUPIL ALLOWANCE IN FLOOR AREA AND AIR SPACE
PERMITTED UNDER VARIOUS STATE LAWS ⁴⁶

<i>State laws of</i>	<i>Minimum number of square feet per pupil</i>	<i>Minimum number of cubic feet per pupil</i>
Indiana		225
Minnesota	18	216
New Jersey	18	200
New York	15	200
Ohio { Primary	16	200
{ Grammar	18	225
{ High School	20	250
Pennsylvania	15	200
Utah	15	200
Virginia	15	200
Louisiana		200

⁴⁶ Compiled from Bulletin No. 47, 1915, United States Bureau of Education.

exist in respect to elementary classroom areas and cubitures in three typical cities clearly point out the great possibilities of waste in child and teacher energy as well as in money costs. In St. Paul, the twenty classrooms of one school building have cubitures of 20,000 cubic feet, when the desirable maximum is less than 10,000. In Omaha ten classrooms have less than 550 square feet of floor area available for forty children, while the desirable minimum is 616. These are situations that can be duplicated frequently. If the standard number of square feet per elementary classrooms were to be considered as ranging from 616 to 768 square feet and the standard range of cubiture were to be considered as ranging from 7,392 to 9,984 cubic feet, the three cities, St. Paul, Omaha, and Paterson would rank as follows:

	<i>St. Paul</i>	<i>Omaha</i>	<i>Paterson</i>
Number of square feet in the median-sized classroom	840	897	702
Percentage of rooms below standard in floor area	2.5	3.4	39.5
Percentage of rooms at standard in floor area	27.0	37.6	49.0
Percentage of rooms above standard in floor area	70.4	59.0	11.6
Number of cubic feet in median classroom	10,700	9,521	8,448
Percentage of rooms below standard in air space	1.2	4.2	36.8
Percentage of rooms at standard in air space	27.4	70.1	55.9
Percentage of rooms above standard in air space	71.2	26.1	7.3
Number of elementary classrooms in this distribution	489	625	481

The Lighting of Classrooms

- The necessity for the modernization of old school buildings is often easily proved by the great defects in the natural lighting system of the classrooms. Various states have already established standards in the ratio between window and floor areas in classrooms and in other lighting factors. This ratio varies from 1 to 7 in Louisiana to 1 to 4 in Virginia. Five of the eight states which have written a ratio into their laws have selected the 1 to 5 standard. Five of seven states still permit by law the construction of classrooms lighted on two sides. The faults of bilateral lighting are so evident that no defense of unilateral lighting seems necessary here.

Tables containing such data for each building in the school system, as the highest ratio between window and floor area in any room, the median ratio in the building, and the lowest ratio in any room, will point out buildings which are most defective in respect to the amount of light provided for children. Such tables may well be supplemented with photometric readings of the amounts of light available from day to day on various desks in each classroom. The percentage of elementary classrooms in five large school systems having less than the 20 per cent ratio of window area to floor space is as follows: St. Paul 67.2 per cent, Omaha 47.1 per cent, Paterson, 64.8 per cent, Salt Lake City 52 per cent, and Denver 96.7 per cent.

The program for modernization of a school plant may, with a not overburdening expenditure, include such minor changes in the lighting of classrooms as will prevent glare on blackboards and the necessity for children looking constantly into strong sky light. The aim of every board of education and superintendent of schools should be the gradual elimination of all lighting except from the left and in conformance with the standards set up in the Strayer Building Score Card. To-day large school plants may be found where even as few as 25 to 30 per cent of all elementary classrooms are lighted from the left only. Only 31 per cent of Omaha's 623 elementary rooms were so lighted in June, 1917. Classrooms had even been added to this school system during the year 1916-1917 which were being lighted largely from the rear of the pupils and only partially from the left.

*Drinking, Washing, and Toilet Facilities for Children in
an Elementary School Plant*

Since the advent of the sanitary drinking fountain, the standard installation suggested for an elementary school building has been one fountain for every seventy-five children of possible building enrollment. Other factors affecting this standard have been: height for each fountain adjusted to size of child utilizing it; the selection of a fountain which does not permit of contact between the metal and the child's lips; the placement of fountains where they are most accessible; the elimination of all fountains from toilet rooms.

School systems are failing to accept even this lenient standard for drinking fountains. A comparison of the drinking facilities provided in the schools of five large cities points out the great variation

in practice. The percentage of buildings below the standard of one fountain for every seventy-five children was, at the time the surveys were made, for St. Paul sixty-seven per cent, Denver thirty-one per cent, Omaha twenty-eight per cent. Any program for rehabilitation of old buildings should include the acceptance of the standards given above and a rigid adherence to them. The demand for the elimination of fountains from toilet rooms and their placement where they are accessible to children when they wish to drink, is based on principles too evident to require restatement. School systems still exist in the United States where no drinking facilities are provided children except in dark, unsanitary, foul-smelling toilet rooms.

The building program of a board of education which fails to include proper consideration for bathing and washing facilities in old, poorly equipped buildings, as well as in buildings under construction, is ostensibly antagonistic to any program of medical inspection or insistence upon child welfare for the promotion of which this board of education is no doubt paying trained physicians and nurses.

It is surprising to find in such school systems as Omaha, Neb., and Paterson, N. J., that no provision is made for hundreds of children for washing their hands during the hours they spend at school. It would seem that money spent for one wash bowl for every 100 children would not be classified as an extravagant expenditure, since it is a matter of common knowledge among physicians that failure to wash the hands at obviously necessary times results in infection and the carrying of disease. The situation in regard to washing facilities as it exists in these two cities may be reduced to these simple terms. In Omaha 1,080 children and in Paterson 320 children are provided with no washing facilities. Here is the percentage of children who share washbowls at school with

	<i>100 more children</i>	<i>More than 150 children</i>	<i>With 200 or more children</i>	<i>With 300 or more children</i>
Omaha	47. %	25. %	8.2%	
Paterson	86.6	71.8	57.3	35.9%

Facilities for bathing that are provided in large school systems, expressed in terms similar to those giving the situation in respect to washing facilities, would appear ridiculous. Such facilities are lacking in large degree in most school systems. Where members of boards of education are reluctant to include shower bath facilities in their school building programs, it may be illuminating to institute a social survey for the purpose of discovering the opportunities for bathing offered many of our school children in our densely populated sections both during the winter and summer.

Any measurement of a school building plant will include a survey of the toilet accommodations provided in the schools. The adequacy of such provisions may easily be reduced to a numerical basis, but unfortunately the problem of sanitation is not as easily presented. Any study of the deficiencies in toilet accommodations in school systems will be followed by a program of additions to facilities provided, as well as modernization of fixtures and further rehabilitation to conform at least to the minimum standards. Few of the school surveys that have been made in the past few years have reported finding toilet provisions which were in moderate degree acceptable.

From a study of the conditions in the Omaha schools in 1917 it was evident that forty-five per cent of all buildings needed additions to their toilet accommodations for boys; that twenty-eight per cent required additional accommodations in the girls' sanitariums; that approximately 100 per cent of all the buildings needed better lighting provisions, both natural and artificial, for their toilet rooms. A program of betterment covering a period of five to ten years should in such cases as this be inaugurated with the purpose of having ultimately a hundred per cent score.

Protection Against Fire and Fire Hazards

From Table XLII the reader is able to ascertain the percentage of buildings in four school systems that were seriously lacking in fire protection facilities and in fireproofness. That only within a comparatively short period has fireproof construction been given consideration in the erection of school buildings is evident from the studies that have been made of the school plants of many of our large cities. All of these studies emphasize in more or less degree

The lack of fire-escapes and fireproofed stairwells;

- The failure to provide wire glass for windows abutting upon fire-escapes;
- The presence of combustible materials under wooden stairways;
- The absence of fire doors and partitions at danger points;
- The absence of extinguishers and other fire apparatus;
- The failure to recharge extinguishers according to directions;
- The absence of exit lights and signs;
- The unprotected nature of ceilings and walls in boiler-rooms;

and many other serious deficiencies that should be cared for through a definite and continuous program for the removal of fire hazards.

One of the most comprehensive programs possible for the removal of fire hazards is the one laid down by Superintendent Spaulding, of Minneapolis, in 1916. His program listed thirty-six items of major importance from additional fire extinguisher apparatus to metal self-closing waste cans. A school executive may well follow the example set by Superintendent Spaulding in ferreting out the danger points in his schools and recommending to his board and community action for their removal or diminution. Spaulding's thirty-six items for protection were: Separating fuel rooms from boiler rooms; fireproofing boiler room ceilings; fireproof boiler room doors; wire glass in boiler room windows; metal window frames; iron ladders in boiler rooms; iron scaffolds to reach boiler valves; fireproof stairs in boiler rooms; removing woodwork from boiler rooms; patching holes in boiler room walls and ceiling; iron ash platforms in boiler rooms; remodeling heating plant; outside exit from boiler rooms; fireproofing space under stairways; improving present fire-escapes; fire walls or curtains between old and new parts of buildings; improving fire alarm system; eliminating defects in electrical systems; repairing or removing gas equipment and extending electric lighting; installing red exit lights and signs in gymnasium-assembly rooms; fire extinguisher equipment; gas shut-off valves; extension of gas stove vents through roof; widening and otherwise improving stairways and additional stairways; replacing wood partitions between classrooms and corridors with fireproof material; protecting wood from steam pipes; repairing and fireproofing foul air duct; changing and adding doors other than those in boiler and engine rooms; alterations and repairs of motion picture booth; metal lining for dry kiln and fireproofing dry heat boxes in high schools; self-closing metal waste cans; metal sawdust boxes; metal-covered shelves in manual training

rooms; oil containers for engine rooms; equipping wood shop with dust collectors; installing a sprinkler system in the basements of sixty-three non-fireproof buildings, as a protection to life and property, mainly the latter, at an average cost of \$2,500 per building.

A summary of the provisions against fire dangers as found in the Omaha schools in June, 1917, is indicative of what may be found in many other school systems.

In Omaha, of the possible sixty-five points to which a perfect building is entitled on the Strayer Building Score Card under the item of fire protection, only thirteen per cent of the elementary buildings were allotted thirty-three points or more. Eighty-seven per cent of the buildings secured less than fifty per cent of the possible score. Only thirty fire extinguishers were installed in the fifty-five elementary schools. This is less than one extinguisher to a school. It is considerably less than the standard of one extinguisher to each 5,000 square feet of floor area. Most of these extinguishers are of the type that require recharging annually. Twenty were found which had not been recharged since 1912. Four had been recharged since December, 1915, while two were recharged shortly after the visit of the committee. Some extinguishers did not bear the necessary tag. One janitor gave as his reason for failure to recharge his extinguisher that he had asked for the chemicals but could not get them from the supply office.

Standpipes and fire hose, in a few instances garden hose, were provided in nineteen elementary schools. Twenty-one buildings had neither fire hose nor extinguisher. These same buildings were in most cases not fireproof; their boiler-rooms were not surrounded by fire-proof partitions; fire escapes were lacking.

Of the fifty two-story or more elementary school buildings in use in 1917, eight were equipped with fire-escapes. These eight buildings had eighteen fire-escapes, of which four on the old Clifton Hill School were made entirely of wood. Twelve of the remaining thirteen fire-escapes might easily have been rendered useless because all the windows facing upon them or underneath them were fitted with plain glass, which offers no resistance to fire.

Many of the facts quoted concerning the Omaha schools will on investigation be found to be equally true of other school systems. They determine the value of adoption in the school building program of a fixed policy for guarding against fire dangers.

The Measurement of Special Room Provision

The percentile distribution of buildings according to the percentage of all possible points allotted to each building for special rooms and special room equipment, as given in Table XLII, affords one means of measurement of the opportunities offered children outside of the regular classrooms. All four cities included in the table stand out as woefully lacking in the special rooms that may be considered to-day essential in a modern school building.

From Table XXXVI it appears that the tendency has prevailed in the past to provide special room facilities in the larger buildings only. With only 214 special rooms listed for the 221 buildings of this table, it is evident that the average per building is exceedingly low. Of these 214 special rooms, thirty-four per cent were devoted to manual training, eighteen per cent to domestic science, five per cent were gymnasiums, eighteen per cent were auditoriums, nine per cent were playrooms, five per cent were lunchrooms, and nine per cent were libraries.

The Report on the Boston Public Schools ⁴⁷ lists the special room equipment of fifty-six school buildings divided as follows among five large cities—Boston, nineteen; Cleveland, eleven; Detroit, ten; Newark, nine; St. Louis, seven. As special rooms were included only those that possessed “a direct educational value for the children,” while those were omitted “which are necessary for administrative purposes but which must be included in every modern school building.”

The frequency of the occurrence of each type of special room mentioned in these lists, as arranged in Table LI, will tend to show on what elements of special room equipment emphasis has been placed in these five large cities. Ninety-three per cent of these buildings were erected in the period 1910–1915.

If the situation in these fifty-six school buildings may be accepted as partially indicative of the tendency in school building construction during this period of 1910–1915, it is clear that playrooms, auditoriums, teachers' rooms, manual training rooms and domestic science or cooking rooms, are the special room equipment that have been given greatest stress. Rest rooms, dispensaries or

⁴⁷ City Document No. 87, 1916.

TABLE LI
FREQUENCY OF THE OCCURRENCE OF VARIOUS TYPES OF SPECIAL ROOMS
IN FIFTY-SIX SCHOOL BUILDINGS OF FIVE LARGE CITIES

TYPE OF SPECIAL ROOMS	<i>City and number of buildings</i>					
	<i>Boston</i>	<i>Cleveland</i>	<i>Detroit</i>	<i>Newark</i>	<i>St. Louis</i>	<i>Total</i>
	19	11	10	9	7	56
Auditorium or assembly hall	10	10		9	5	34
Domestic science or cooking room	9	7	10		1	27
Dispensary or clinic		10	8			18
Elevator		2				2
Filter room		2				2
Handball court		1				1
Housekeeping suite		2				2
Doctor's room and waiting room				8		8
Gymnasium		10		5	5	20
Kitchenette		7				7
Kitchens		1	1			2
Dining room			1			1
Library		1	10	5		16
Manual training	10	7	10		1	28
Nurses' room	17					17
Playrooms	17	5	10		6	38
Open-air cot rooms		1				1
Natatorium		5				5
Physical instructor				6		6
Medical inspection and rest room					5	5
Kindergarten					5	5
Medical inspection					1	1
Rest rooms	1	11	6		1	19
Room for blind		1				1
Sewing room		1				1
Lunch room		1				1
Recitation			10			10
Cot rooms			1			1
Sun room		1				1
Teacher room or rooms	18		2	7	4	31
Teacher lunch		8				8
Shower and locker rooms		6	1		6	13
Waiting room			2			2
Unassigned		3				3
Warming room		1				1

clinics, nurses' rooms, libraries, and shower and locker rooms, are next in the order of emphasis. The Boston Report shows the variation in special rooms for each twenty regular classrooms in each of the five cities. The number varies from 4.7 in Newark to 13.5 in Cleveland.

PART III

FINANCING A BUILDING PROGRAM

I. THE ABILITY TO PAY FOR THE NECESSARY ADDITIONS TO A SCHOOL BUILDING PLANT

In the determination of the ability of a community to pay for necessary extensions to a school building plant, such elements as the actual per capita wealth, per capita net debt, tax rate per \$1,000 of actual valuation, actual wealth per child in average daily attendance, the cost of maintenance of the schools on various bases, the expenditures for school outlays over a period of years, and the proportion of municipal expenditures devoted to educational purposes, form the basis for any conclusions.

Where considerations involving the expenditures of moneys for school building extensions arise, intelligent action requires that such essential facts should be available as the amount of taxable wealth expressed in terms of a single inhabitant, in terms of a child of school census, or even in average daily attendance, as well as the city's outstanding indebtedness expressed in the same terms. Accurate figures involving the wealth of a community are extremely difficult to obtain, due to our varied systems of assessment and our proportional scheme of taxation. The United States Bureau of the Census, in presenting wealth data for American cities in its annual issue of *Financial Statistics of Cities*, takes care to point out the many difficulties encountered as well as the inaccuracies that may affect the most painstakingly gathered data. It is safe to state that these data presented in these volumes are the most accurate obtainable at the present time.

From the facts presented in the *Financial Statistics of Cities* for 1916, Table LII was formulated. Here is given the estimated true value of assessed wealth of all cities above 30,000 for the year 1916. The location of any individual city in this table will assist in the determination of its 'ability to pay'. It may be assumed that cities falling below the median are not as capable of providing school building facilities as those above the median. West Hoboken,

N. J., with an estimated true per capita assessment of \$596.80, may be required to weigh more carefully its expenditures for school purposes than Brookline, Mass., with its estimated assessment of \$3,883.07 per capita. A city like Paterson, N. J., falling in the \$701-\$800 group, or in the lowest quartile, may have justification for the poor rating which it secures from a measurement of its school plant. On the other hand, St. Paul, classified in the \$1,401-\$1,500 group, or in the fourth quartile, is inexcusably culpable in maintaining a school plant which has nine out of fifty-two buildings rating at 500 points or less on the Strayer Building Score Card.

The tendency in many city surveys has been to locate the city being surveyed in a group of selected cities. If the basis of selec-

TABLE LII

ESTIMATED TRUE VALUE OF PER CAPITA ASSESSMENT IN ALL CITIES OF THE UNITED STATES HAVING A POPULATION OF 30,000 OR OVER IN 1916 ⁴⁸

<i>Estimated true value of per capita assessment</i>	<i>Number of cities</i>
501- 600	3
601- 700	8
701- 800	19
801- 900	23
901-1,000	37
1,001-1,100	19
1,101-1,200	20
1,201-1,300	22
1,301-1,400	11
1,401-1,500	13
1,501-1,600	12
1,601-1,700	10
1,701-1,800	3
1,801-1,900	3
1,901-2,000	3
2,001-2,100	3
2,101-2,200	1
2,301-2,400	1
3,101-3,200	1
3,801-3,900	1
<i>Total number of cities</i>	<i>213</i>
<i>Median</i>	<i>\$1,087</i>

⁴⁸ Compiled from *Financial Statistics of Cities*, 1916, pp. 342 ff.

tion of cities is acceptable, such comparisons may be profitable. Such a comparison with the city of St. Paul as the median city, as shown in Table LIII, gives the data for the two consecutive years 1915 and 1916 and also for 1911. The correlations between the rankings for the years 1911 and 1916 and 1915 and 1916, established according to the Spearman formula, are $+ .88$ and $+ .84$ respectively. It is reasonably fair in this instance to take the assessments for the one year 1916 only as the basis for comparison,

TABLE LIII

ESTIMATED REAL WEALTH PER CAPITA OF ST. PAUL AND TWENTY-FOUR
OTHER CITIES FOR THE THREE YEARS 1911, 1915 AND 1916

	<i>Estimated true values of per capita assess- ment for 1911</i>	<i>Rank in list</i>	<i>Estimated true values of per capita assess- ment for 1915</i>	<i>Rank in list</i>	<i>Estimated true values of per capita assess- ment for 1916</i>	<i>Rank in list</i>
Cincinnati	1,339.55	9	1,489.22	9	1,461.49	10
Newark	1,001.56	18	1,036.22	20	1,053.41	20
Washington	1,358.57	8	1,740.39	4	1,733.48	2
Minneapolis	1,568.54	5	2,126.57	1	1,682.58	3
Seattle	1,813.66	3	1,558.78	6	1,428.91	12
Jersey City	921.16	22	938.08	21	975.28	21
Kansas City, Mo.	1,297.40	10	1,513.60	8	1,656.78	5
Indianapolis	1,471.75	6	1,542.43	7	1,543.64	6
Portland, Ore.	2,054.96	1	1,800.39	3	1,775.02	1
Denver	1,206.24	13	1,644.32	5	1,415.56	13
Rochester	1,043.33	17	1,231.19	16	1,086.94	18
Providence	1,152.72	15	1,411.51	10	1,404.29	14
St. Paul	1,454.16	7	2,055.12	2	1,461.80	9
Columbus	1,255.69	12	1,348.31	13	1,345.36	15
Oakland	1,590.48	4	1,268.07	15	1,528.74	7
Toledo	1,256.69	11	1,356.60	12	1,430.53	11
Worcester	982.73	19	1,103.65	18	1,117.75	17
Syracuse	923.88	21	1,150.79	17	926.26	22
New Haven	962.88	20	1,067.72	19	1,058.34	19
Scranton	697.97	25	746.41	25	730.32	25
Spokane	1,925.81	2	1,310.83	14	1,512.04	8
Paterson	759.69	24	812.35	24	786.04	24
Omaha	1,201.20	14	1,410.65	11	1,673.91	4
Fall River	843.33	23	817.28	23	833.85	23
Grand Rapids	1,050.61	16	918.71	22	1,289.85	16

as was done by Strayer and Engelhardt in the *St. Paul Survey*.⁴⁹ The one year basis may not be fair where other groups of cities are involved. The inference may follow that if serious error has crept into the estimates of the per capita assessments, it remains constant for the years 1911-1916.

Another index of the ability of a community to pay for extensions to the school plant is the tax rate on each \$1,000 of the esti-

TABLE LIV

DISTRIBUTION SHOWING CHANGES IN RANKS OF TWENTY-FIVE CITIES
COMPARED ON THE BASIS OF THE AVERAGE RATE OF TAXATION PER
\$1,000 OF ESTIMATED REAL VALUE OF PROPERTY FOR THE YEARS 1909,
1910, 1911, 1913, 1915, AND THE RATE FOR ONE YEAR ONLY, I. E., 1915

	1909	1910	1911	1913	1915	Average for five years	Rank for 1915	Rank in average	Difference in rank
Cincinnati	17.90	17.21	14.55	14.39	15.01	15.81	10	5	5
Newark	16.64	16.72	17.18	17.84	18.15	17.31	2	1	1
Washington	10.31	10.28	10.00	10.00	10.28	10.17	21	20	1
Minneapolis	9.86	11.50	12.41	12.28	9.08	11.03	24	18	6
Seattle	9.49	9.96	8.55	9.08	15.42	10.50	9	19	10
Jersey City	12.09	12.60	12.43	13.86	13.47	12.89	11	10	1
Kansas City, Mo.	11.33	11.30	11.24	11.70	12.60	11.63	15	15	
Indianapolis	8.39	9.24	9.18	9.54	9.99	9.27	23	23	
Portland, Ore.	8.87	6.71	7.92	8.58	11.46	8.71	16	24	8
Denver	15.80	16.63	15.62	15.38	10.96	14.88	18	8	10
Rochester	16.36	16.06	15.81	16.28	16.35	16.17	8	4	4
Providence	14.70	14.70	14.70	12.69	12.80	13.92	13	9	4
St. Paul	10.34	10.68	10.88	10.32	7.56	9.96	25	22	3
Columbus	16.02	15.09	10.92	10.82	10.93	12.78	19	12	7
Oakland	6.94	7.69	9.16	10.30	16.65	10.15	5	21	16
Toledo	16.73	16.70	11.59	7.50	10.74	12.65	20	13	7
Worcester	14.14	14.01	14.72	14.80	16.87	14.91	4	7	3
Syracuse	18.02	17.58	16.53	14.14	16.57	16.57	7	3	4
New Haven	14.88	16.00	16.09	14.51	17.23	15.74	3	6	3
Scranton	10.45	11.34	11.11	12.33	12.66	11.58	14	16	4
Spokane	9.62	7.18	7.35	7.35	10.00	8.30	22	25	3
Paterson	12.19	11.33	11.27	11.00	12.83	11.72	12	14	2
Omaha	10.73	9.32	12.96	13.12	11.29	11.48	17	17	
Fall River	16.25	15.84	16.41	16.48	20.06	17.01	1	2	1
Grand Rapids	12.40	11.31	11.01	12.76	16.58	12.81	6	11	5

⁴⁹ *St. Paul Survey*, 1917, p. 196.

mated true value of property. The average of the tax rates on \$1,000 of estimated value of property for a period of years probably furnishes a fairer basis for ranking cities of a given group than simply the rate per \$1,000 of estimated value for one year. It is quite clear that a lean year in the matter of municipal expenditures may

TABLE LV
DISTRIBUTION OF TAX RATES PER \$1,000 OF ESTIMATED TRUE VALUE
OF PROPERTY—CITIES 30,000 AND OVER ⁸⁰

<i>Tax rate per \$1,000 of estimated true value</i>	<i>1909</i>	<i>1910</i>	<i>1911</i>	<i>1912</i>	<i>1913</i>	<i>1915</i>	<i>1916</i>
3.01- 4.00			2	1	1		
4.01- 5.00	2	2	1	2	3	4	2
5.01- 6.00	3	1	2	2	2	1	4
6.01- 7.00	3	5	5	6	5	4	4
7.01- 8.00	7	11	12	9	9	4	5
8.01- 9.00	9	7	9	8	9	9	10
9.01-10.00	13	10	14	20	17	27	19
10.01-11.00	20	19	23	18	17	11	21
11.01-12.00	22	23	22	25	26	25	23
12.01-13.00	12	15	17	19	20	19	14
13.01-14.00	14	20	14	15	17	19	19
14.01-15.00	7	14	19	20	17	13	17
15.01-16.00	11	13	14	13	14	15	21
16.01-17.00	19	18	20	17	15	13	10
17.01-18.00	5	12	11	7	11	9	11
18.01-19.00	5	6	2	5	6	8	6
19.01-20.00	1	3	4	3	4	5	16
20.01-21.00	3	2	1	1	1	10	3
21.01-22.00	1	1		2	2	4	3
22.01-23.00		1	1		1	1	2
23.01-24.00	1			1	1	2	
24.01-25.00				1	1		
25.01-26.00							1
26.01-27.00						1	
27.01-28.00							
<i>Total number of cities</i>	<i>158</i>	<i>183</i>	<i>194</i>	<i>195</i>	<i>199</i>	<i>204</i>	<i>212</i>
<i>Medians</i>	<i>12.14</i>	<i>12.91</i>	<i>12.42</i>	<i>12.35</i>	<i>12.04</i>	<i>12.90</i>	<i>13.23</i>
<i>25 percentiles</i>	<i>10.19</i>	<i>10.52</i>	<i>10.16</i>	<i>10.05</i>	<i>10.23</i>	<i>10.19</i>	<i>10.58</i>
<i>75 percentiles</i>	<i>15.51</i>	<i>15.80</i>	<i>15.39</i>	<i>14.97</i>	<i>14.79</i>	<i>16.93</i>	<i>16.00</i>

⁸⁰ Compiled from *Financial Statistics of Cities*.

follow a period of generous self-taxation for the common good. An average for a period of years, therefore, seems a more desirable measure. The group of cities of Table LIV has been ranked for the one year 1915 and also on the basis of the average for five years. The correlation between the two rankings as determined by the Spearman formula is $+ .71$, a rather significant relationship. The correlations by the Spearman formula of the rankings of the year 1915 with the rankings of each of the years 1909, 1910, 1911, and 1913 are $+ .38$, $+ .40$, $+ .56$, and $+ .64$ respectively. It will be concluded that greater justice will be done a community by ranking them according to their payments for a period rather than for one year.

Table LV permits of a more complete orientation as regards the tax rates per \$1,000 of estimated true values than would any comparisons in selected groups.

This frequency distribution contains all cities with a population over 30,000 for the years recorded arranged in relationship to the tax rate per \$1,000 of estimated true value. Where a city is found to be constantly in the two lower quartiles of the distribution given in Table LV, it may be considered as evidence of a failure to contribute bountifully to community enterprises. Four school systems which have had intensive studies made of their school building plants have their tax rates per \$1,000 of estimated true values given below.

	1909	1911	1913	1915	1916
St. Paul	10.34	10.88	10.32	7.56	11.33
Omaha	10.73	12.96	13.12	11.29	12.33
Brookline ⁵¹					10.95
Paterson	12.19	11.27	11.00	12.83	14.19

There is evidence, if these tax rates per \$1,000 of estimated true value of property are compared with the medians for all cities as found in Table LV, that these cities cannot be classified as being overtaxed for the support of public enterprises. In the case of each of these cities, the survey committees criticized severely the failure to provide in all instances adequate school housing for the

⁵¹ Data not given in *Financial Statistics of Cities*.

children of the city. The slight increase in tax rate per \$1,000 in any of these cities necessary to provide proper school housing facilities would not single out any one of them as over-generous, if the tax rates of the cities of the third and fourth quartiles are to be taken as criteria. Where the validity of utilizing estimated real values for comparative purposes is questioned, one may turn to distributions of per capita tax levies for the purpose of pointing out the taxing tendencies in all cities. It is realized, however, that wealth and not population is utilized almost exclusively as the base for taxation in the United States. Were the four cities above

TABLE LVI

COMPARISON OF THE PER CAPITA TAX LEVIES OF FOUR CITIES WITH CERTAIN PERCENTILES OF A PER CAPITA TAX LEVY DISTRIBUTION OF ALL CITIES ABOVE 30,000

	1909	1910	1911	1912	1913	1915	1916
Number of cities ⁸²	158	184	194	195	199	204	213
Median	11.60	12.00	11.95	12.50	12.53	14.11	14.18
25 percentile	9.21	9.40	9.78	9.94	9.75	10.82	11.27
75 percentile	13.85	14.71	14.97	15.58	15.35	17.89	17.73
St. Paul	13.10	12.98	12.60	12.17	11.90	14.86	16.57
Omaha	16.05	14.60	15.40	16.67	16.39	15.93	20.32
Brookline							42.53
Paterson	9.16	8.59	8.56	8.78	8.48	10.20	11.16

mentioned to be compared with the percentiles of the per capita tax levies for all cities for the period 1909-1916, the conclusions drawn would vary only slightly from those deduced from Table LV. Table LVI presents such comparisons.

Paterson does not rise above the twenty-five percentile for any year. Omaha is above the seventy-five percentile, while St. Paul has taken an intermediate place between the median and seventy-five percentile. Brookline has an exceedingly high per capita levy for the one year 1916. A high rate should be expected, since Brookline's wealth per capita is also exceedingly high.

⁸² Data from *Financial Statistics of Cities*.

The Per Capita Net Debt of a City

It is conceivable that a city might compare most favorably with other cities in its per capita wealth and still feel unwilling to increase its expenditures on account of the large debt already incurred. Of course, if this debt were very large it would appear in the tax rate. It seems wise, however, to compare the total net debt and the per capita net debt when considering increases in school outlays. The per capita net debt for American cities varied in 1916 from \$2.40 in Butte, Montana, to \$212.48 in San Diego, California. The median city had a per capita net debt of \$42.65, as shown in Table LVII. The four cities St. Paul, Omaha, Paterson, and Brookline were recorded as having net debts of \$43.33, \$106.75, \$37.00, and \$50.76 respectively for the year 1916. Omaha alone of the four stands at the higher end of the distribution. That Omaha has accumulated this large debt per capita and still lacks in school housing facilities is a serious reflection on the past educational leadership of that city. The school system should have been permitted to have had its just proportional part in the accumulation of this debt. St. Paul had in 1916 a net debt slightly above the median of the '30,000 and over' cities, Brookline fell into the third quartile, and Paterson into the second. On the basis of net debt alone, it would seem that these three cities might be considered as being in positions to build, without serious financial strain, modern buildings to supplant at least four or five of the structures which were so severely condemned in the surveys.

The proportion devoted to school purposes of the entire amounts appropriated by a community for the support of municipal activities requires very important consideration when increases for school outlays are being proposed. In Table LVIII will be found a distribution of the per cents of total expenditures for city maintenance devoted to schools as arranged for all cities over 30,000 in population for each one of the years 1909, 1910, 1911, 1912, 1913, 1915, 1916. There has been a rather consistent increase in the median ratio from 1909 to 1916. The seventy-five percentile also shows a splendid increase. Cities which find their percentages static or retrogressive for this same period of years have in the results of this table an additional argument for additions to available school funds. In using this table it will be borne in mind that cities like

Paterson, N. J., with 125,000 inhabitants concentrated in approximately seven square miles, will in all probability not be required to contribute as heavily to such items as street, sewer, fire, and police maintenance as will cities that have larger acreages and much lower population densities.

It may be said that this increase in the ratio of moneys devoted to school purposes was to be expected during the period 1909-1916, since this period was a period of increasing salaries and since normally sixty to seventy-five per cent of school appropriations is

TABLE LVII⁵³DISTRIBUTION OF CITIES OVER 30,000 ACCORDING TO PER CAPITA NET DEBT⁵⁴

<i>Per capita net debt</i>	<i>Number of cities</i>
\$5.00 and less	3
5.01-\$10.00	4
10.01- 15.00	7
15.01- 20.00	18
20.01- 25.00	18
25.01- 30.00	15
30.01- 35.00	19
35.01- 40.00	15
40.01- 45.00	14
45.01- 50.00	13
50.01- 55.00	19
55.01- 60.00	9
60.01- 65.00	15
65.01- 70.00	7
70.01- 75.00	6
75.01- 80.00	2
80.01- 85.00	3
85.01- 90.00	3
90.01- 95.00	6
95.01-100.00	5
100.01-105.00	1
105.01-110.00	2
110.01-115.00	3
115.01-120.00	2
120.00 and over	4
	213
<i>Median</i>	\$42.65

⁵³ *Financial Statistics of Cities*, 1916, pp. 321 ff.⁵⁴ Net debt is funded and floating debt less sinking fund assets.

devoted to the payment of salaries. That communities have been gradually increasing the ratio devoted to schools, irrespective of the fact that salaries have been increasing, may be seen in the following tables, where the per capita governmental cost payments for education are compared with those of the other two city departments involving the employment of the greatest number of individuals: i. e., the fire and the police departments. That salaries have increased in these two departments during this same period has been also true. The fire and police departments have, however, as these figures show, fallen back very perceptibly in their competition for financial favor. In other words, superintendents of schools may find in these facts rather conclusive arguments to back any reasonable increase which they may demand in the percentage of total municipal expenditures locally allowed for education, should they find their cities ranking low on Table LVIII.

TABLE LVIII

PER CENT OF CITY EXPENSES DEVOTED TO SCHOOLS ⁵⁵
IN ALL CITIES OF 30,000 OR OVER (1909-1916)

Number of Cities Devoting Specified Per Cent of Expenses to Schools

<i>Per cent</i>	<i>1909</i>	<i>1910</i>	<i>1911</i>	<i>1912</i>	<i>1913</i>	<i>1915</i>	<i>1916</i>
10.0-14.9			2	1	3	1	1
15.0-19.9	2	3	3	4	2	4	4
20.0-24.9	16	16	18	19	20	12	12
25.0-29.9	18	22	26	28	30	38	39
30.0-34.9	42	44	49	44	43	37	34
35.0-39.9	31	43	37	41	40	40	38
40.0-44.9	28	25	33	33	33	33	39
45.0-49.9	12	19	21	19	17	24	26
50.0-54.9	4	6	4	6	9	14	18
55.0-59.9					2		
60.0-64.9						1	2
<i>Total</i>	<i>153</i>	<i>178</i>	<i>193</i>	<i>195</i>	<i>199</i>	<i>204</i>	<i>213</i>
<i>25 percentile</i>	<i>30.2</i>	<i>30.3</i>	<i>29.9</i>	<i>29.4</i>	<i>29.2</i>	<i>29.4</i>	<i>29.8</i>
<i>75 percentile</i>	<i>39.2</i>	<i>41.2</i>	<i>40.8</i>	<i>41.1</i>	<i>41.2</i>	<i>42.6</i>	<i>43.9</i>
<i>Median</i>	<i>34.6</i>	<i>35.4</i>	<i>34.8</i>	<i>35.2</i>	<i>35.2</i>	<i>35.9</i>	<i>36.9</i>

⁵⁵ Compiled from *Financial Statistics of Cities*.

It has been a common practice in making financial comparisons of cities in surveys to use the figures for one year only in the comparisons. In pointing out the differences in the per cents of governmental cost payments devoted to schools in groups of selected cities, the relationships existing during a one-year period have been utilized as the basis of argument. The Brookline, Butte, Salt Lake City, Denver, and other surveys have followed this plan. Table LX presents data for a period of five years for a group of cities showing the shifting of rank for each city during this period. Fig. 6 shows the shifting still more clearly. The cities utilized in this comparison compose the list used by Strayer and Engelhardt in the building survey of St. Paul, Minn., in 1917. It will be noted that comparatively few cities of the list maintain their rankings over this period. Very oddly, the first and last cities in the list are most uniform as to ranking. Illustrations of the injustice of using merely

TABLE LIX
COMPARISON OF PER CAPITA GOVERNMENTAL COST PAYMENTS FOR
EDUCATION, POLICE DEPARTMENT AND FIRE DEPARTMENT

*Cities 30,000 and Over, 1909-1916*⁵⁸

Ratio of the median per capita governmental cost payments for educational, police, and fire departments of the years 1909-1916 to the median per capita expenditures for 1909.

<i>Year</i>	1909	1910	1911	1912	1913	1915	1916
Education	1.00	1.009	1.042	1.074	1.071	1.198	1.267
Police	1.00	1.008	1.006	1.008	.991	1.033	1.076
Fire	1.00	.972	.965	1.013	1.006	1.062	1.068

Ratio of the seventy-five percentile of per capita governmental cost payments for educational, police and fire departments of the years 1909-1916 to the seventy-five percentile per capita expenditures for 1909.

<i>Year</i>	1909	1910	1911	1912	1913	1915	1916
Education	1.00	1.021	1.090	1.105	1.109	1.213	1.308
Police	1.00	.968	.987	.950	.944	1.043	1.018
Fire	1.00	1.005	.977	.977	.971	1.062	1.028

⁵⁸ Basic data from *Financial Statistics of Cities, 1909-1916* (1914 lacking).

one year's rankings are seen in the other three cities which have been charted in Fig. 6. Omaha's position varies from fifth to eighteenth, Seattle from eleventh to twenty-third, while Syracuse varies only slightly each year. It is ostensibly fair to rank Syracuse as twenty-first in the list. It is surely not fair, on the other hand, to designate Seattle's rank as twenty-third on the basis of the last year only.

TABLE LX

DISTRIBUTION OF THE PER CENT OF ENTIRE EXPENSES FOR
MUNICIPAL PURPOSES DEVOTED TO SCHOOLS

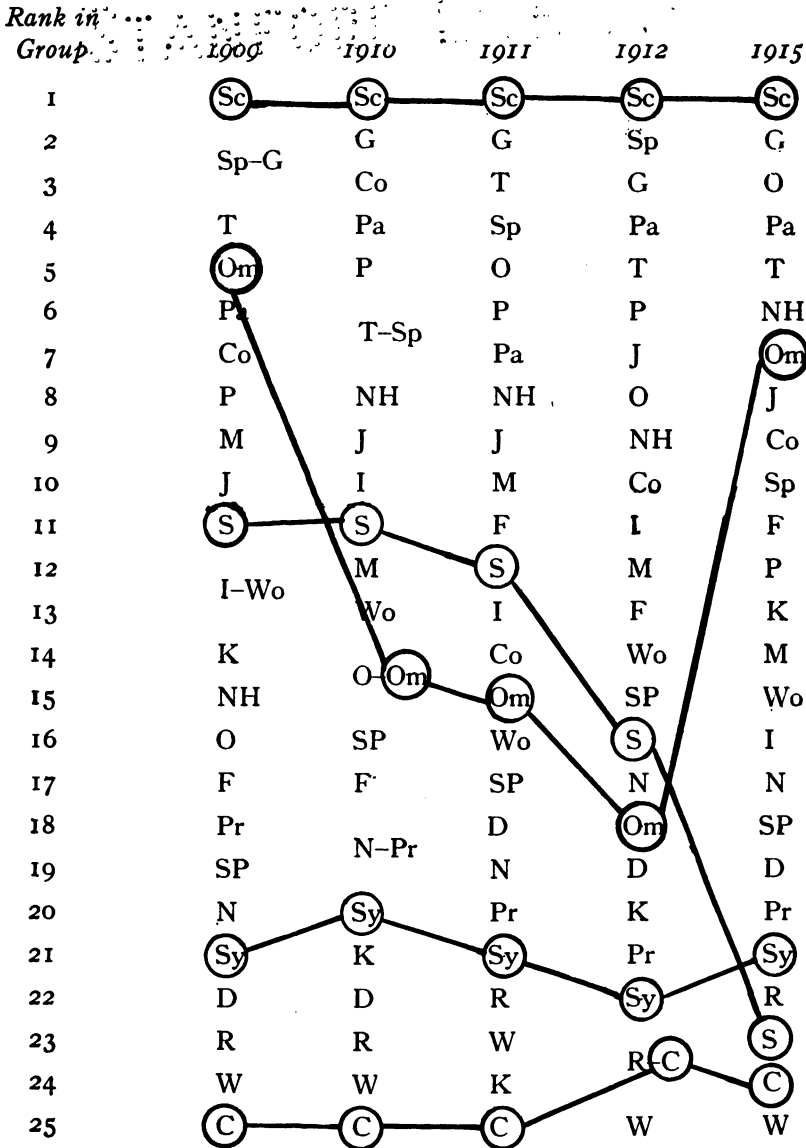
*Comparison of St. Paul with Twenty-four Selected Cities*⁴⁷

	1909	1910	1911	1912	1915	Average per cent
Cincinnati	24.6	24.6	24.9	26.1	26.3	25.3
Newark	30.2	30.4	29.7	31.3	30.6	30.4
Washington	25.6	25.4	26.3	26	25.8	25.8
Minneapolis	37.2	34.1	35	33.7	34.6	34.9
Seattle	35.2	34.4	33.7	31.5	26.9	32.3
Jersey City	35.5	35.2	35.1	37.1	37.4	36.1
Kansas City, Mo.	34.3	30	25.8	29.2	35.3	30.9
Indianapolis	34.5	34.5	33.6	33.8	32.7	33.8
Portland, Ore.	38.5	38.6	37.1	38	36	37.6
Denver	29.5	28.6	30.5	29.4	29.6	29.5
Rochester	28.9	27.5	27.5	26.1	27.8	27.6
Providence	31.6	30.4	29.5	29.1	29.4	30
St. Paul	30.5	31	31.6	31.6	29.8	30.9
Columbus	39.2	39.1	33.5	34.2	37.3	36.7
Oakland	33.4	33	37.7	35.8	40.7	36.1
Toledo	40.7	38.3	39.7	38.4	38.9	39.2
Worcester	34.5	33.7	31.7	32.9	34.5	33.5
Syracuse	30	30.3	28.9	28.1	28	29.1
New Haven	33.9	35.7	35.2	35.2	38.4	35.7
Scranton	48.6	45.7	47.2	46	44.5	46.4
Spokane	40.9	38.3	38	39.1	37.2	38.7
Paterson	39.4	38.9	36.3	38.7	39.3	38.5
Omaha	39.7	33	32.9	31	37.8	34.9
Fall River	32.1	30.9	34.4	33	36.3	33.3
Grand Rapids	40.9	39.5	39.9	39	42	40.3

⁴⁷ For basis of selection, see *St. Paul Survey*, 1917.

FIG. 6

CHART SHOWING THE RANKINGS FOR FIVE YEARS OF THE CITIES OF
TABLE LX ON THE BASIS OF THE PERCENTAGE OF ALL MONEYS
RAISED FOR MUNICIPAL PURPOSES DEVOTED TO SCHOOLS



Governmental Cost Payments for Expenses of Schools

Another measure of a community's tendency toward the support of education is its per capita expenditure for schools. The distribution of this item for cities over 30,000 in 1916 is given in Table LXI. Any individual city may readily be placed on this distribution and comparisons made with the median city or the city at the seventy-five percentile.

When governmental cost payments for schools expressed in terms of the single inhabitant of a city are utilized as the bases for comparisons, valuable factors of community composition not brought to the fore in the tabulations already mentioned are forced into play. Cities having large parochial or private school enrollments will tend to rate higher in such comparisons than cities where the public schools are attended by larger percentages of the children. High percentages of unmarried adults will tend to rank cities low in this particular table.

When the relationship between per capita expenditures for schools in various school systems is utilized for the purpose of ranking the cities involved, it may be wise to base the ranking on an average for a period of years rather than upon one year only. The cities of Table LXII are those utilized on page 375 of the *Grand Rapids Survey* (1916). Fig. 7 presents the variations in rankings of these eighteen cities for a period of seven years. In that time Nashville dropped from the upper half to the lower half of the table, New Bedford rose from thirteenth to sixth place and then dropped back to eighth, and Dayton changed from third place to eleventh. In putting before the public tables and charts giving data for one year only, the selection of the year for which data are shown may make much difference in the conclusions that may be drawn. Grand Rapids, the city being surveyed, retained approximately the same position for the seven-year period. Only five, or sixteen per cent of a maximum of thirty possible rankings in the lowest quartile (including ranks 15, 16, 17, 18, 19), have fallen to cities north of the Mason and Dixon's line. One city, Bridgeport, is responsible for these five ratings. This grouping emphasizes the fact that cities south of the Mason and Dixon's line have not begun to assess themselves for educational purposes as northern cities have done,

TABLE LXI

DISTRIBUTION OF THE PER CAPITA GOVERNMENTAL COST PAYMENTS OF
EXPENSES FOR SCHOOLS—CITIES OVER 30,000 (1909-1916) ⁶⁸

<i>Per capita payments</i>	1909	1910	1911	1912	1913	1915	1916
Less than \$2.01	2	3	6	3	5	1	
2.01-2.25		2	1	3	4	5	3
2.26- 2.50	9	8	6	4	1	3	5
2.51- 2.75	5	1	5	6	10	2	3
2.76- 3.00	8	11	11	11	6	3	4
3.01- 3.25	7	15	15	8	10	12	8
3.26- 3.50	15	9	10	16	14	9	11
3.51- 3.75	15	15	12	11	13	5	5
3.76- 4.00	13	20	20	12	12	10	7
4.01- 4.25	15	14	14	18	18	13	14
4.26- 4.50	19	20	21	15	21	14	9
4.51- 4.75	11	16	12	22	16	18	13
4.76- 5.00	10	8	11	11	9	16	17
5.01- 5.25	7	12	14	10	17	20	13
5.26- 5.50	6	7	8	9	6	12	20
5.51- 5.75	1	4	7	8	10	13	18
5.76- 6.00	5	1	4	5	3	9	8
6.01- 6.25	2	3	3	3	2	4	10
6.26- 6.50	2	4	2	4	4	5	5
6.51- 6.75		1	3	4	6	3	6
6.76- 7.00			2	4	2	6	5
7.01- 7.25		2	3	2	3	5	5
7.26- 7.50				1	1	4	6
7.51- 7.75			1	1	2	3	4
7.76- 8.00				1			2
8.01- 8.25		1				2	3
8.26- 8.50	1					1	
8.51- 8.75		1	2	1	3		3
8.76- 9.00				2		2	
9.01- 9.25						1	2
9.26- 9.50							1
9.51- 9.75						2	
9.76-10.00						1	2
10.01-10.25					1		
10.26-10.50							1
<i>Total</i>	153	178	193	195	199	204	213
<i>75 percentile</i>	\$4.65	\$4.74	\$5.01	\$5.16	\$5.15	\$5.69	\$6.04
<i>Median</i>	4.04	4.09	4.19	4.34	4.33	4.86	5.14

⁶⁸ Compiled from *Financial Statistics of Cities*.

and hence do not offer an adequate basis for comparisons with northern cities.

By taking the per capita expenditures for six years for three cities, the school buildings of which are rated in Table XLIII and

TABLE LXII

PER CAPITA EXPENDITURES⁸⁹ FOR ALL SCHOOL PURPOSES OF
GRAND RAPIDS AND EIGHTEEN SELECTED CITIES⁹⁰

	1909	1910	1911	1912	1913	1915
Des Moines	\$5.82	\$6.41	\$7.16	\$6.71	\$7.26	\$7.62
Scranton	4.21	4.27	4.45	4.58	4.49	4.69
Paterson	4.24	4.09	3.76	4.13	4.38	4.57
Fall River	3.57	3.95	4.06	4.21	4.16	5.18
Lowell	4.00	3.89	3.94	4.03	3.98	4.30
Grand Rapids	4.90	4.48	4.71	5.34	5.21	5.89
Cambridge	4.86	5.01	4.92	5.03	5.14	5.72
Lynn	3.76	3.89	3.96	4.11	4.02	4.49
New Bedford	3.67	3.96	4.14	4.56	4.41	4.70
Springfield, Mass.	6.15	6.43	6.86	7.27	7.07	8.24
Kansas City	4.44	5.29	4.28	4.66	4.22	6.18
Nashville	4.28	2.62	3.21	3.44	3.40	3.89
Albany	3.84	3.98	4.07	4.19	4.17	4.80
Bridgeport	3.07	3.01	2.96	3.26	3.29	3.99
Dayton	4.97	4.32	4.51	4.21	4.15	4.49
San Antonio	2.74	2.76	2.96	3.08	3.31	4.13
Memphis	2.49	2.88	3.13	3.46	3.39	3.74
Birmingham	2.32	2.07	2.96	2.80	2.66	3.09
Richmond	2.34	2.34	2.54	2.93	2.89	4.09

comparing with the medians of Table LXI, we find that Paterson varies only slightly from the medians of the six years, that St. Paul has fallen below the median for all years except 1909, and that Omaha varies between the seventy-five percentile and the median. In 1916 Omaha was only a trifle above the median, though above the seventy-five percentile in 1914 and 1915. In other words, reasonable additional sums paid for school purposes in these three cities would tend to place them among cities of the fourth quartile,

⁸⁹ Data from *Financial Statistics of Cities*.

⁹⁰ Cities used in the *Grand Rapids Survey*, 1916.

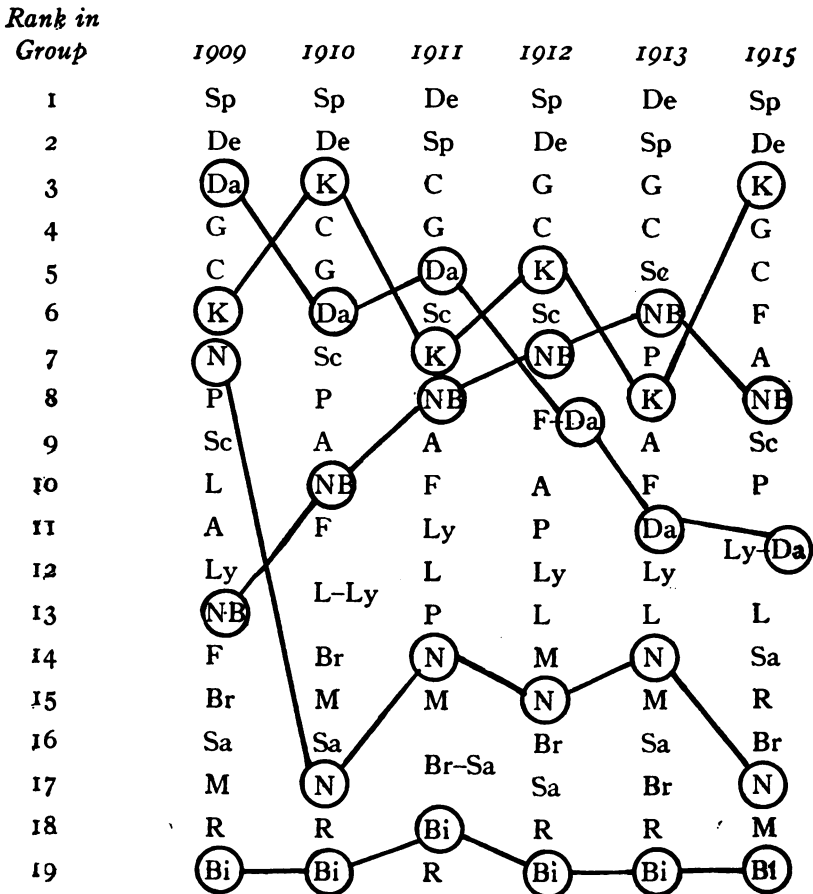
or those most generous in their appropriations for schools on a basis of the amounts spent for each city inhabitant.

Cost Per Pupil in Average Daily Attendance

It is conceivable that a city might devote a relatively small proportion of its available revenue for schools and still maintain them

FIG. 7

VARIATIONS IN RANKINGS OF EIGHTEEN CITIES FOR A PERIOD OF SIX YEARS, OBTAINED ON THE BASIS OF THE EXPENDITURES PER INHABITANT FOR ALL SCHOOL PURPOSES



adequately by virtue of the very large amount of money raised by taxation. The possibility of maintaining an adequate system of schools is, however, determined in large measure by the amount of money spent per pupil in average daily attendance.

The distribution of cities in the United States during the years 1909 and 1916, as given in Table LXIV according to the amounts spent per pupil in average daily attendance, might well furnish a basis for establishing the position of any individual city in its tendency to pay for educational advantages.

The basic data used in the compilation of this table were the expenditures for maintenance as listed in the annual reports of the United States Commissioner of Education for the years represented in the table and the average daily attendance as given for each year in these same reports.

TABLE LXIII
PER CAPITA EXPENDITURES FOR ALL SCHOOL PURPOSES OF THREE
CITIES—PATERSON, ST. PAUL, AND OMAHA

<i>Years</i>	1909	1910	1911	1912	1913	1915	1916
Paterson	\$4.24	\$4.09	\$3.76	\$4.13	\$4.38	\$4.57	\$4.76
St. Paul	5.32	4.04	3.98	4.12	4.02	4.72	4.43
Omaha	4.81	4.74	4.92	5.07	4.99	5.93	5.29

An analysis of the original data clearly indicated that if the cities in the United States were separated into three groups according to their geographic location, three distinctly different tendencies in expenditures for public education would become evident. These tendencies are shown clearly in Table LXV, which gives the medians for each of the three groups as well as the number of cities for each group upon whose data the medians are based. Cities in Group A are those north of the Mason and Dixon's line and the Ohio River and east of the Mississippi River. Group B includes all cities above 25,000 west of the Mississippi except those of the four states specifically mentioned in C. Group C includes all cities south of the Ohio River and Mason and Dixon's line and in the states of Texas, Arkansas, Oklahoma, and Louisiana.

The medians of Group B are the highest for each year, those of Group A occupy an intermediary position, while those of Group C are exceedingly low.

TABLE LXIV

THE DISTRIBUTION OF AMERICAN CITIES HAVING POPULATIONS OF 25,000 OR OVER ON THE BASIS OF THE AMOUNTS SPENT FOR SCHOOL MAINTENANCE PER PUPIL IN AVERAGE DAILY ATTENDANCE FOR THE YEARS 1907-1916 ^a

Number of cities spending per pupil in average daily attendance a sum from

Years	\$11- \$15.00	\$16- \$20.00	\$21- \$25.00	\$26- \$30.00	\$31- \$35.00	\$36- \$40.00	\$41- \$45.00	\$46- \$50.00	\$51- \$55.00	\$56- \$60.00	\$61- \$65.00	\$66- \$70.00	\$71- \$75.00	\$76- \$80.00	\$81- \$85.00	\$86- \$90.00
1907-1908	4	7	18	43	52	42	9	12				1				
1908-1909	2	7	15	46	53	37	21	5	2	1						
1909-1910	2	5	11	36	47	37	18	12	2	3						
1910-1911		2	13	20	38	33	21	12	3	2	1					
1911-1912		5	10	24	40	38	33	17	8	3	1	1				
1912-1913		7	11	13	38	53	31	15	14	5	4	1				2
1913-1914		7	9	10	40	48	26	24	21	4				1		
1914-1915		3	8	13	28	43	37	19	19	9	6	1	1	1	1	
1915-1916		5	6	12	31	34	41	31	22	14	3	2	2	2		2

^a The two hundred and thirty-three cities considered are those classified in the *Annual Report of the Commissioner of Education* for 1917 as having populations of 25,000 and over. The variations in the total number of the cities for the different years, as shown in this table, are due (1) to the lack of figures for any one year or years in the statistical tables, (2) to the exclusion of obviously incorrect figures, and (3) to the exclusion of figures taken from statistics for other years than for the one under consideration. The annual cost per pupil for each city was computed from the *Annual Reports of the United States Commissioner of Education, 1908-1917*.

The trend throughout the United States has been markedly upward in the cost per pupil in average daily attendance for the years represented. A city which occupies a relatively low position on the distribution in Table LXV, because of either false or true economy, should have no difficulty in raising funds for any needed extension to its school plant. A city which has been generous in its expenditures or has failed to economize properly, and hence ranks high in this distribution, should not penalize its children by failing to provide the necessary school building extensions. Possible economies in school maintenance may be found where the high cost of maintenance is presented as an argument against provisions for proper building additions. Further analyses of how the money spent for school maintenance has been distributed among the several items of the school budget as compared with other cities will throw light on the points of wastage within the system. It may be stated, however, that school maintenance costs may be expected to continue on the increase.

TABLE LXV

MEDIANS OF THE AMOUNT SPENT FOR SCHOOL MAINTENANCE PER PUPIL IN
AVERAGE DAILY ATTENDANCE FOR THE YEARS 1907-1916 FOR ALL
CITIES HAVING A POPULATION OF 25,000 OR OVER ⁶²

Years	Total number of cities in				Median city in			
	Group A	Group B	Group C	Total	Group A	Group B	Group C	Total
1907-1908	125	31	32	188	\$33.44	\$37.94	\$24.89	\$33.12
1908-1909	131	32	26	189	33.44	37.67	25.29	33.31
1909-1910	118	29	26	173	34.78	40.38	26.71	34.46
1910-1911	98	28	19	145	36.00	42.25	28.50	35.94
1911-1912	120	33	27	180	37.82	45.06	28.92	37.45
1912-1913	124	38	32	194	38.70	45.38	28.00	38.64
1913-1914	131	35	28	194	39.40	49.21	31.56	39.39
1914-1915	125	36	28	189	40.79	51.42	30.00	40.95
1915-1916	136	36	33	205	43.21	52.25	31.31	42.76

⁶² Group A includes cities north of the Ohio River and Mason and Dixon's line, but east of the Mississippi River.

Group B includes cities west of the Mississippi River, except those of Texas, Arkansas, Louisiana, and Oklahoma.

Group C includes all southern cities east of the Mississippi River and the cities of Texas, Arkansas, Louisiana, and Oklahoma.

*Expenditures for Capital Outlays in Cities of the United States
for the Period 1899-1916*

In an effort to show the expenditures for school outlays in cities of the United States on a comparable basis, Table LXVI has been formed. The term school outlays covers "the costs of properties, including land, buildings and equipment, and improvements more or less permanent in character."⁶³ The cost data were taken from

TABLE LXVI

DISTRIBUTION OF PER CAPITA EXPENDITURES FOR SCHOOL OUTLAYS
FOR 206 CITIES FOR TOTAL PERIOD, 1899-1916

<i>Amount</i>	<i>No. of Cities</i>
\$0-\$1.99	6
2- 3.99	11
4- 5.99	11
6- 7.99	9
8- 9.99	21
10-11.99	15
12-13.99	20
14-15.99	29
16-17.99	12
18-19.99	18
20-21.99	17
22-23.99	8
24-25.99	12
26-27.99	5
28-29.99	4
30-31.99	3
32-33.99	2
34-35.99	2
36-37.99	0
38-39.99	0
40-41.99	1
<i>Total</i>	206
25 Percentile	\$9.33
Median	14.68
75 Percentile	20.24

⁶³ *Financial Statistics of Cities*, 1916, p. 28.

the annual reports of the Commissioner of Education from columns headed 'permanent investments and lasting improvements', 'buildings and other permanent improvements, sites and grounds' as they appeared for various years, and 'outlays, new buildings, grounds and equipment', which is the more recently used heading for this item of expenditure. The United States Census figures for the years 1900-1910 were utilized in securing the per capita costs. The population for the years between census periods was reckoned for each city by adding a proportional amount of the growth of the passing decade to the figures obtained by the census enumerators at the beginning of each decade.

The total per capita expenditure for the period involved in the table is considered a fair index of the provisions that have been made for that period in adequate school housing. Such a tabulation made for the city of St. Paul showed St. Paul ranking twenty-third out of twenty-five cities of her class in the per capita expenditures for school outlays over a period of fifteen years. This failure to build new school buildings was again evidenced in the low scores assigned by the judges to the existing school buildings of that city, as shown in Table XLIII.

TABLE LXVII

TOTAL PER CAPITA EXPENDITURES FOR SCHOOL OUTLAYS FROM 1899 TO 1915
IN ST. PAUL AND TWENTY-FOUR OTHER CITIES

Cincinnati	\$20.29	Oakland	\$33.14
Newark	26.34	Toledo	19.49
Washington	22.10	Worcester	12.61
Minneapolis	23.50	Syracuse	12.57
Seattle	32.47	New Haven	15.46
Jersey City	21.65	Scranton	12.69
Kansas City, Mo.	28.64	Spokane	35.15
Indianapolis	15.59	Paterson	15.28
Portland, Ore.	35.40	Omaha	20.11
Denver	19.24	Fall River	10.65
Rochester	15.24	Grand Rapids	17.60
Providence	9.68	Highest	35.40
St. Paul	11.09	Lowest	9.68
Columbus	11.35	Average	19.89

2. PAYMENT FOR NEW SCHOOL BUILDINGS

The cost of permanent improvements in American school systems has been chiefly met in the past by four different plans:

1. By cash payment made possible by taxation additional to that required for maintenance purposes.
2. By the issuance of bonds maturing at the end of a stated period of years, payment being made by a refunding of such bonds.
3. By the issuance of bonds falling due at a stated interval, payment to be met through the establishment of a sinking fund.
4. By the issuance of serial bonds, the last payment falling due in from ten to forty years.

The plan of paying cash for school buildings is not readily accepted by communities, since the opinion prevails that in the case of permanent improvements, the life of which will extend over a period of years, not only the generation that builds but also the generations that utilize such structures should be required to pay their fair share of the initial cost. Ithaca, New York, may be cited as a splendid example of communities that have been found willing to pay for new school buildings by special taxation covering a period of five years, thus obviating the necessity for bond issues and the annual interest item for inclusion in the budget. Through a series of misfortunes, Ithaca found herself in need of new school accommodations. The plan of payment pursued is here given as outlined by Superintendent Boynton.

After one month's public discussion in the press and otherwise, it was voted two to one at a public tax election to build a new high and grammar school building to cost \$300,000, \$250,000 of which was to be raised by direct taxation in a single assessment, the other \$50,000 being insurance money.

By a special act of the legislature affecting this city, the individual tax might be paid in five equal annual installments, the four deferred payments to bear interest at five per cent. Any person not desiring to avail himself of the deferred payments might pay his entire tax in a single payment without such penalty. The rate for this special tax was \$25 per thousand. This \$25 per thousand was the total increase required for the \$250,000 tax and was distributed over the five years for those who took the deferred payments but was included in one year for those who paid the tax at one time.

It cannot be expected that many communities will follow such a splendid example as has been set by cities like Ithaca. The tendency of postponing payments for municipal improvements has

developed with so little opposition in our cities that the change to a cash basis or a complete 'pay as you go' policy will only come gradually. Cities which are growing with extreme rapidity can be assured that the 'pay as you go' policy is the only fair one to adopt toward future generations. Where the life of a city has been short and the needs in the way of permanent improvements are becoming, because of the rapidly increasing population, more and more acute, obviously the 'pay as you go' policy is the only businesslike procedure to adopt.

Superintendent R. G. Jones in his *Review of the Rockford, Illinois Schools of 1915-1916*,⁶⁴ presents a tabulation showing the difference in costs when paying for five schools on a cash basis and a twenty-year serial bond basis. These figures are "based upon these assumptions: (1) that the city of Rockford will grow as rapidly during the next fifteen years as it has in the past fifteen; (2) that the assessed valuation will increase as much during the next fifteen years as it has in the past fifteen; (3) that the school population will increase in the same ratio during the next fifteen years as it has during the past."

Mr. Jones estimates that on this basis the total cost of these five buildings for each \$100 of assessed valuation will be \$2.3394 if the bond plan is followed, and \$2.3248, or a trifle less, if the cash basis is utilized.

The second of the plans utilized in the past in the payment for new school buildings has nothing to commend it. It is an extremely unbusinesslike practice to refund when school bonds become due, and leads to a multitude of schemes and expedients for concealment of the real purpose for refunding.

The provisions covering the payment of bonded indebtedness in Massachusetts cities are "based upon the theory that municipalities should be required to pay their debts as soon as possible. Failure to recognize the wisdom of this policy is certain to spell financial disaster sooner or later for a city or town, for experience has proven that the taxpayers of each generation have sufficient burdens of their own without being obliged to carry those of their predecessors."⁶⁵ The 'pay as you go' policy is being recognized as

⁶⁴ p. 19.

⁶⁵ *Report of a Special Investigation Relative to the Indebtedness of the Cities and Towns of the Commonwealth*, Wright & Potter Printing Co., Boston, 1912, p. 21.

necessary for the future solvency and progress of a city. Portland, Ore., Denver, Washington, Louisville, and New Orleans have resorted to this plan in the payment for new school buildings.

The practice of amortizing the bonded obligations of school systems by means of a sinking fund has been rather common. The two types⁶⁶ of sinking funds found in American cities are those with and those without investments. Judging from studies that have been made of the administration of sinking funds, it appears that neither type of fund is satisfactory in providing payment for bonds. The prevailing criticisms against the sinking fund plan are (1) the misuse of sinking fund moneys on the part of public officials, (2) the unscientific basis employed in the calculation of sinking fund requirements, (3) the difficulty of instructing the public in the complex nature of sinking fund plans, (4) the failure to provide for proper investment of funds, (5) the inability of a democracy to constantly provide the financial leadership necessary for the proper maintenance of the fund, (6) the failure to establish a proper fund and to make adequate annual contributions thereto so that there would be a sufficient amount in the fund to meet the debt at maturity, (7) the failure of proper audits by others than the governing parties, (8) the success of the serial payment plan of bonding and its ease of comprehension by the public, (9) the lack of appreciation on the part of governing bodies of the importance of sinking fund obligations—the primal security of the bond holder.

The following quotations show the general attitude toward the sinking fund plan:

Even when the greatest care is exercised in the conduct of sinking funds, the best measures that can be followed either fall short of meeting the requirements or overshoot the mark. This is inevitably consequent upon the uneven amounts and periods in which the funds lie uninvested and at best yield only bank interest on idle deposits. Sinking funds conducted upon scientific principles and taking advantage of all established mathematical laws of annuities and averages invariably come very close to providing the required amount. They are never exact, however, and only by the exercise of extreme care and watchfulness by experts in such matters can a close approximation be secured. Moreover, there are being constantly uncovered in the revision of public accounting methods and procedure sinking fund schemes conducted so irrationally and with such disregard of mathematical rudiments

⁶⁶ *Financial Statistics of Cities*, 1916, p. 100.

as to lose all value and significance. They are merely spasmodic and wild guesses at the requirements and reflect no coordinate provision whatever.⁶⁷

A sinking fund, however well it may be administered, is at best a cumbersome means of accomplishing the desired end, since it involves not only the obligation to keep the funds properly invested, but complicated mathematical computations to insure equitable assessments upon the taxpayers during the period of the loan in order that the debt may be paid at maturity; and the evidence is abundant of the establishment of sinking funds by our Massachusetts cities and towns, doubtless in good faith, to which proper contributions have not been made from year to year, with the result that upon the maturity of the loans these funds are found to be far short of the amount necessary to pay the debt, with extension by refunding as the inevitable result. The serial method of paying debt, on the other hand, not only obviates the administrative requirements of the sinking fund method, but it has been demonstrated to be cheaper than the latter and it, therefore, imposes a lighter burden upon the taxpayers, in the long run; not the least of its advantages also is the fact that its operation is so simple as to be easily understood by the ordinary citizen.⁶⁸

Investors have come to realize the uncertainty of the sinking fund, as administered by public officials, to provide a stable means for the payment of bonds they hold, and consequently are demanding a more positive form of payment.⁶⁹

Officials are becoming convinced that it is financially inadvisable to maintain sinking funds with investments and are advocating funds of the second class or the issue of serial bonds so maturing as to obviate the necessity of any kind of sinking fund. It is to be noted in this connection that of the twenty-five cities with no sinking funds in 1916 the majority reported no funded obligations other than serial bonds.⁷⁰

Table LXVIII ⁷¹ shows the importance that must be attached to the proper administration of the educational debt problem. Of all total non-productive debts listed in the table, it will be seen that the most remarkable increase during the period 1880-1912 occurred in the debt for educational purposes. This increase was from two per cent to eleven per cent of the total debt. The increase on no other single item approaches this amount.

⁶⁷ *The Daily Bond Buyer*, March 26, 1917.

⁶⁸ *A Special Investigation Relative to the Indebtedness of the Cities and Towns of the Commonwealth*, Boston, 1912, p. 23.

⁶⁹ *Report of the Commission for the Survey of Municipal Financing*, Trenton, N. J.

⁷⁰ *Financial Statistics of Cities*, 1916, p. 101.

⁷¹ *The Purposes of Indebtedness of American Cities, 1880-1917*, Bureau of Municipal Research, New York.

The serial bond plan overcomes most of the objections already enumerated. The short-term serial bond method is being more generally accepted as the best plan for financing school buildings which cannot be paid for by immediate taxation. The data of Table LXIX show clearly the method of payment for a ten-year serial bond issue of \$3,000,000.

TABLE LXVIII

CHANGES IN THE TOTAL DEBT FOR SPECIFIC PURPOSES (1880 TO 1912)

<i>Purpose</i>	<i>Number of cities</i>		<i>Per capita burden</i>		<i>Per cent of total debt</i>	
	<i>1912</i>	<i>1880</i>	<i>1912</i>	<i>1880</i>	<i>1912</i>	<i>1880</i>
Total indebtedness	195	59	90.58	69.21	100	100
Total productive debt	159	43	28.63	16.99	31.6	24.5
Water-works	145	39	16.22	14.48	17.9	20.9
Improvement of waterways	21	20	4.15	1.81	4.6	2.6
Electric and gas	23	1*	.52	.68	.6	1.0
Cemeteries	10	6	.01	.02		
All other	68	22	11.89	1.83	13.1	2.6
Total nonproductive debt	195	57	61.95	52.22	68.4	75.5
Educational	187	28	10.76	1.39	11.9	2.0
Recreation	123	19	5.36	4.98	5.9	7.2
Highways	168	31	10.20	9.07	11.2	12.9
Sewers	161	30	5.96	2.30	6.6	3.5
Bridges	104	18	3.43	2.40	3.8	3.5
Buildings	86	36	2.34	2.74	2.6	4.0
Protection	113	13	1.25	.26	1.4	.4
War	*	24	*	3.31	*	4.8
Railroads and other aid	*	30	*	5.71	*	8.3
Funding	82	39	7.15	11.45	8.0	16.5
Refunding	85	30	3.81	6.36	4.2	9.2
Miscellaneous (all purposes)	*	19	*	2.25	*	3.2
Combined and unreported:						
Funded	123	*	4.25	*	4.7	*
Special assessment	41	*	3.14	*	3.4	*
Miscellaneous (general)	115	*	3.99	*	4.6	*
Municipal industries	18	*	.30	*	.3	*

* Items not included among separate items in the year indicated.

The serial bond plan causes the heaviest payments to be made in the early years. If the heavier payments are made early, it will permit of greater improvements in the years to come. The serial bond plan is simple, is easily understood by all citizens, and offers no administrative difficulties.

The recommendation made by the Director of the Bureau of Statistics of the Commonwealth of Massachusetts in his special investigation above mentioned that cities be authorized to incur debt for the acquiring of land and the building of schools within a twenty-year period only and that towns be required hereafter to provide for the payment of funded debt by the serial method, so called, is a recommendation that may be followed with profit by any board of education in paying for its building program. In Sections 5, 13, and 14 of the Municipal Indebtedness Act of 1913 of Massachusetts, these suggestions have become law.

Section 5. Cities and towns may incur debt, within the limit of indebtedness prescribed in this act, for the following purposes, and payable within the periods . . . specified.

3. For acquiring land for any purpose . . . and for the construction of buildings . . . including the cost of original equipment and furnishing, twenty years.

LXIX

COST OF A BOND ISSUE OF \$3,000,000-SERIAL TEN-YEAR
BONDS WITH INTEREST AT FOUR PER CENT

<i>Year</i>	<i>Annual payments on a 10-year 4 per cent basis</i>	<i>Annual interest at 4 per cent</i>	<i>Amount to be raised by taxation each year plus interest</i>
1919	\$300,000	\$120,000	\$420,000
1920	300,000	108,000	408,000
1921	300,000	96,000	396,000
1922	300,000	84,000	384,000
1923	300,000	72,000	372,000
1924	300,000	60,000	360,000
1925	300,000	48,000	348,000
1926	300,000	36,000	336,000
1927	300,000	24,000	324,000
1928	300,000	12,000	312,000
<i>Total</i>	<i>\$3,000,000</i>	<i>\$660,000</i>	<i>\$3,660,000</i>

4. For the construction of additions to schoolhouses . . . including the cost of original equipment and furnishings, where such additions increase the floor space of said buildings to which such additions are made, twenty years.

Section 13. No further sinking funds for the payment of debt shall be established by any city or town. . . .

Section 14. Cities and towns shall not issue any notes payable on demand, and they shall provide for the payment of all debts . . . by such annual payments as will extinguish the same at maturity, and so that the first of such annual payments on account of any loan shall be made not later than one year after the date of the bonds or notes issued therefor, and so that the amount of such annual payments in any year on account of such debts, so far as issued, shall not be less than the amount of principal payable in any subsequent year, and such annual amount, together with the interest on all debts, shall, without further vote, be assessed until the debt is extinguished. . . .

The New Jersey Commission for the Survey of Municipal Financing reported in 1915 strongly in favor of the serial bond. They found:

From an exhaustive investigation that the installment payment bond, commonly known as the 'Serial Bond', is invariably displacing the term bond, with sinking fund provisions for payment. The operation of this plan is simple and yet most positive, and will prove a more economical and efficient means of financing public requirements.

Bond houses, investors and the officials of municipalities who have given this matter serious thought, recommend serial bonds for financing debt obligations.

The favorable price at which serial bonds have sold in the past year proves their economic market value, and adds conclusive proof to the favor that this form of bond has with the buyers of municipal securities.

The serial plan does away with all the perplexities and risks of collecting, investing, and safeguarding the sinking fund. It eliminates the long chain of 'ifs' that are present in the sinking fund plan. It provides a means of financing public obligations, with constantly decreasing carrying charges, and will go a long way toward putting municipalities on a 'Pay as you go' basis. . . .

The serial bond embodies all the principles of sound financing, simplifies the administration of public affairs, and will prove a most efficient means of doing away with the refunding bond.

Table LXX shows the annual payments and total cost of an issue of 30-year \$100,000 bonds bearing $4\frac{1}{2}$ per cent interest, under the sinking fund and serial plans of payment. The comparisons are analyzed as follows:

Difference in total cash outlay on $3\frac{1}{2}$ per cent sinking fund basis is \$23,363.90 equal to \$8,323.45 compounded at $3\frac{1}{2}$ per cent, i. e., Term Bonds should sell at \$1.08323, to make the outlay cost on equal terms with serial bonds at par.

Difference in total cash outlay on 4 per cent sinking fund basis is \$17,740.30 equal to \$5,777.54 compounded at 4 per cent, i. e., Term Bonds should sell at \$1.05777 to make the outlay cost on equal terms with serial bonds at par.

There is no difficulty in discovering abuses of the serial plan form of payment for school housing. When bonds have been issued for too long a period such abuses may occur. Even though the last of a bond issue still remains to be paid, the chief executive frequently finds it necessary to recommend the complete abandonment or rehabilitation of the building for which the bonds were originally issued. This is one reason why short term issues preferably for ten years or less, never above fifteen years, seem the wisest.

No bond issue should be permitted which will outlive the improvement or building itself. The need for such a policy is recognized by at least one state in its state laws relating to public education. Texas permits bonds issued for school building purposes to run forty years, but where the school-house is built of wood the bonds may not run longer than twenty years. Of forty-five states twenty-five⁷² had in January, 1913, laws on their statute books determining the maximum life of bonds that might be issued by school district, town, or city. Of the twenty-five cases noted, the maximum life in three instances was forty years. In one case thirty-four years, in two cases thirty years, in three cases twenty-five years, in ten cases twenty years, in five cases fifteen years, and in one case ten years. The minimum life was also established in some of these laws. In one case, i. e., New Mexico, directors of school districts may not issue bonds for erecting and completing school-houses to run "not less than twenty years nor more than thirty years." In two cases, ten years is set as the minimum life of bonds, while in school districts in South Dakota "no bond shall be payable in less than three nor more than fifteen years."

The actual practice which communities in the United States have followed during this past year 1917 in regard to the life of school bond issues is presented in Table LXXI. This table includes

⁷² Hood's *Digest of State Laws Relating to Public Education*, United States Bureau of Education, Bulletin No. 47, 1915, p. 325 ff.

bonds issued for all educational purposes. Straight bonds are those falling due at the end of a period of years. In reading the serial bond section of the table it must be borne in mind that the period

TABLE LXX ⁷³
COMPARISONS OF \$100,000 30-YEAR 4½ PER CENT BONDS UNDER THE
SINKING FUND AND SERIAL PLANS OF PAYMENT

End of year	Annual payments with 3½ per cent sinking fund basis for term bonds	Annual payment with 4 per cent sinking fund basis for term bonds	Annual payment for serial bonds
1	\$6,437.13	\$6,283.01	\$7,833.33
2	6,437.13	6,283.01	7,683.33
3	6,437.13	6,283.01	7,533.33
4	6,437.13	6,283.01	7,383.33
5	6,437.13	6,283.01	7,233.33
6	6,437.13	6,283.01	7,083.33
7	6,437.13	6,283.01	6,933.33
8	6,437.13	6,283.01	6,783.33
9	6,437.13	6,283.01	6,633.33
10	6,437.13	6,283.01	6,483.33
11	6,437.13	6,283.01	6,333.33
12	6,437.13	6,283.01	6,183.33
13	6,437.13	6,283.01	6,033.33
14	6,437.13	6,283.01	5,883.33
15	6,437.13	6,283.01	5,733.33
16	6,437.13	6,283.01	5,583.33
17	6,437.13	6,283.01	5,433.33
18	6,437.13	6,283.01	5,283.33
19	6,437.13	6,283.01	5,133.33
20	6,437.13	6,283.01	4,983.33
21	6,437.13	6,283.01	4,833.33
22	6,437.13	6,283.01	4,683.33
23	6,437.13	6,283.01	4,533.33
24	6,437.13	6,283.01	4,383.33
25	6,437.13	6,283.01	4,233.33
26	6,437.13	6,283.01	4,083.33
27	6,437.13	6,283.01	3,933.33
28	6,437.13	6,283.01	3,783.33
29	6,437.13	6,283.01	3,633.33
30	6,437.13	6,283.01	3,483.33
	\$193,113.90	\$188,490.30	\$169,750.00

⁷³ Report of the New Jersey Commission for the Survey of Municipal Financing, 1915.

1-10 includes serial bonds running from 3-8 years, 4-9 years, etc. The period 1-20 years would in like manner include 5-15 years, 6-18 years, etc., serial issues. The table points out that many school systems are still issuing bonds running for periods of upwards of fifteen years.

State laws have also attempted to regulate the rate of interest at which bonds may be sold, decreeing at the same time that no bonds should be sold at less than par. The maximum interest rate determined upon by statute varies from four per cent in our eastern states to eight per cent in the western states. The actual rates of interest designated on 1,560 issues of school bonds of the year 1917 varied, as is seen in Table LXXII from $3\frac{1}{2}$ per cent to 6 per cent. The average for all 1917 issues was 4.973 per cent; the median was 5 per cent. Of these bonds, a very large majority were sold at par or slightly above. The distribution is given in this table according to

TABLE LXXI
SCHOOL BOND ISSUES OF 1917—DISTRIBUTED BY TERMS OF YEARS

Amount of issue	Term of years													
	Straight bonds								Serial bonds				Total	
	0-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	Total	1-10	1-20	1-30		1-40
Less than \$4,999	58	61	38	27	3	1			188	20	10		1	219
\$5,000-\$9,999	29	36	32	33	4	8		1	143	8	21	3		175
10,000-19,999	19	43	35	51	10	8	1	1	168	11	35	4	4	222
20,000-29,999	6	36	35	33	7	4		2	123		16	5		144
30,000-49,999	8	31	36	25	6	10			116	3	10	3	4	136
50,000-99,999	4	14	35	34	19	7	1	3	117	1	15	9	5	147
100,000-199,999	7	10	17	24	5	6	1		70	3	8	2	2	85
200,000-299,999	2	2	5	2	2	5		5	18		1	3	2	24
300,000-399,999	1	1	2	1				1	6			1		7
400,000-499,999			1	1					2			1		3
500,000-599,999			1	1					2		2	1	2	7
600,000-699,999												1		1
700,000-799,999				2					2					2
800,000-899,999														
900,000-999,999						1			1					1
1,000,000-														
1,499,999														
1,500,000-														
1,999,999	1								1		1			2
	133	234	237	234	56	50	3	8	937	46	119	33	20	1,175

Average term of years for all except serial bonds, 13.15.

Median term of years for all except serial bonds, 13.31.

Compiled from Municipal Bond Sales, 1917, New York City.

TABLE LXXII: SCHOOL BONDS ISSUED IN 1917—DISTRIBUTED BY AMOUNTS OF ISSUE AND RATES OF INTEREST

Amount of issue	Rate of interest																	Total
	3.5	3.65	4	4.125	4.2	4.25	4.4	4.5	4.55	4.7	4.75	5	5.1	5.14	5.25	5.5	6	
Less than \$4,999			32					13			2	335			1	13	75	471
5,000 9,999			15			2		17			2	121				6	60	323
10,000 19,999			13			3		42			6	119			1	19	42	245
20,000 29,999			12			3	1	36			5	92				8	15	172
30,000 49,999			11			2	1	41			2	78				3	10	148
50,000 99,999	1	1	16	1	1	5	1	44		1	5	79					5	160
100,000 199,999			8			6	1	30	2		3	37	1	1		1	1	91
200,000 299,999			4	1		4		6			1	8	1					25
300,000 399,999			3					4										7
400,000 499,999						2		2					1					5
500,000 599,999			1					3				3						7
600,000 699,999								1										1
700,000 799,999			1									1						2
800,000 899,999																		
900,000 999,999				1														1
1,000,000 1,499,999																		
1,500,000 1,999,999	1			1														2
Total	2	1	117	3	1	27	4	239	2	1	27	873	2	1	2	50	208	1,560

the amounts of issue. Evidently issues of small amounts carry higher interest rates.

Table LXXIII brings out clearly the sectional variations in these rates throughout the United States.

TABLE LXXIII ⁷⁴

SECTIONAL RATES OF INTEREST ON SCHOOL BOND ISSUES

	<i>Number of bonds reported</i>	<i>Average rate of interest</i>	<i>Lowest rate of interest</i>	<i>Highest rate of interest</i>
New England States	36	4.27	4	4½
Middle Atlantic States	158	4.58	3½	6
South Eastern States	106	5.40	3½	6
Central States	308	4.80	3.65	6
West of Mississippi	939	5.09	4	6
United States	1,560	4.973	3½	6

Where legal statute provides certain limitations as to the amount of educational debt permissible, serious difficulties may be encountered in the financing of a school building program.

The Commonwealth of Massachusetts has found that where restrictions have been placed upon the incurring of funded debt of cities through general statute, the number of special acts demanded by communities for exemption from the burden of the statute has practically vitiated the restriction.⁷⁵ Where the limitation is expressed in terms of percentages of total valuations, the remedy is clear where one hundred per cent valuations are not the practice. That limitations on a local debt are desirable will not be denied. If the limitation is reasonable and already reached the 'pay as you go' policy might be a possible solution where no general or special per capita tax limit has been written upon the statute books.

From Table LXXIV it seems reasonable to infer that American communities are not burdening themselves with too excessive debt burdens for school buildings. The funded debts for American cities incurred in the erection of school buildings ranged at the end of

⁷⁴ Compiled from Municipal Bond Sales, 1917, New York.

⁷⁵ *Report of a Special Investigation Relative to the Indebtedness of the Cities and Towns of the Commonwealth*, Boston, 1912, p. 19 ff.

the calendar year 1916 from \$23,000 in Charleston, S. C., to \$121,110,894 in New York City. The median point on this distribution is approximately \$610,000. The medians of this table may rightly

TABLE LXXIV
FUNDED DEBT INCURRED IN THE ERECTION OF SCHOOL BUILDINGS
AS EXISTING IN 1916 ⁷⁶

Dates of	In cities whose population in 1916 was					Total
	500,000 and over	300,000 to 500,000	100,000 to 300,000	50,000 to 100,000	30,000 to 100,000	
Less than \$100,000			1	5	5	11
\$100,001- 300,000				8	33	41
300,001- 500,000				12	24	36
500,001- 700,000			3	9	15	27
700,001- 900,000			4	6	4	14
900,001- 1,100,000			4	5	1	10
1,100,001- 1,300,000			5	5	2	12
1,300,001- 1,500,000			8	6		14
1,500,001- 1,700,000		1	7	1		9
1,700,001- 1,900,000			1	3		4
1,900,001- 2,100,000			3	1		4
2,100,001- 2,300,000			1	1		2
2,300,001- 2,500,000						0
2,500,001- 2,700,000						0
2,700,001- 2,900,000						0
2,900,001- 3,100,000						0
3,100,001- 4,000,000	1	1	5			7
4,000,001- 5,000,000		1	1			2
5,000,001- 6,000,000		2				2
6,000,001- 7,000,000	1					1
7,000,001- 8,000,000		1	1			2
8,000,001- 9,000,000	2	3				5
9,000,001-10,000,000						0
Over 10,000,000	3					3
<i>Total No. of Cities</i>	7	9	44	62	84	206
<i>Median Points ⁷⁷</i>	8,500,000	5,500,000	1,225,000	633,000	333,000	610,000

⁷⁶Compiled from *Financial Statistics of Cities*, 1916, 326 ff.

⁷⁷Approximate

In the final analysis of the ability of any community to pay, the following medians may be utilized as measures. A superintendent of schools who locates his own city in reference to the medians given on this table will find it profitable to use the rating obtained in presenting to his public the expenditures and financial needs of the school system which has been put into his charge.

**MEDIANS OF ALL CITIES OF 30,000 POPULATION AND OVER ON VARIOUS
FINANCIAL DISTRIBUTIONS, 1909-1916**

[illegible]

CONCLUSIONS

Some of the underlying principles involved in developing school building programs have been reviewed in the foregoing pages. Public service corporations have in the past found it necessary to couple prognostications of population growth with far-sighted planning in order that they might provide a maximum of service at a minimum of expenditure. The telephone companies of our large cities have been notable examples of such procedure. It has been the writer's experience that relatively few school systems, however, give consideration to their building needs except as the immediate demand for more accommodations occurs.

Detailed studies of large school systems like those of St. Paul, Omaha, and Paterson, have pointed out that such a lack of planning has prevailed over the entire period during which the school plants were actually being constructed. The failure to recognize acceptable standards, the location of buildings without direct reference to future population or school needs, the failure to purchase adequate sites so that sufficient playground space could be provided for children, and especially the failure to purchase sites in advance, are evidences of the lack of any systematic building programs in these cities.

The available literature on school building programs is very limited. The programs as outlined for Minneapolis, Milwaukee, St. Paul, Omaha, Framingham, and a few minor places, as mentioned in the bibliography, are, as far as the writer has been able to ascertain, the only definite attempts to put into tangible form the anticipated building needs of school systems. The constantly increasing costs of school building construction, combined with the growing demand for economy and efficiency in education, have emphasized the need for the development of school building programs in all of our cities. In this way only will unnecessary duplication be avoided, building faults resulting from ignorance or haste be reduced to a minimum, and educational needs anticipated so that suitable and economical structures will be built.

The writer has conceived a school building program as being divided into three major parts: first, the measurement of population; second, the measurement of the school plant; and third, the measurement of the ability of the community to pay for extensions to the school plant. It has been pointed out that the majority of American cities develop with such a degree of regularity that population growth may be anticipated with a fair degree of reliability over a period of years to come. The studies that have been made by the telephone companies in Milwaukee and Omaha show what may be done in the way of prognostication. The relationship between total population and school population vitally affects the school building program. In order that school administrators may check the accuracy of their own school census this relationship between school and total population for cities has been shown. Where the addition of one child to the school enrollment means an expenditure of one hundred and fifty to two hundred dollars for housing and equipment, the reason for knowing the exact number of children who are entitled to the care and attention of the school system is evident.

That the problem of securing an accurate school census has not been given very serious consideration by many school executives is evident from the tables showing the relationship claimed between total population and school population. The school executive who finds his school system ranking in the first and fourth quartiles of these distributions may indeed find it profitable to inquire into the accuracy and reliability of his census figures. It would seem that every community, in order to anticipate school needs, must have a thorough system of registration for all children within the community. The individual who is compelled to serve the state should be compelled to secure that education which will permit him to serve the state according to the best of his abilities.

In Part I have also been presented methods utilized in developing building programs in various localities. When selection is being made of cities for purposes of comparison, it has been pointed out that such a selection should be made not on the basis of total population as it exists at the time of selection, but on the basis of approximately equal increments to population over a period of two or three decades. Thus is provided a list of cities whose school building problems have presented somewhat similar difficulties.

The measurement of the school building plant with and without the aid of a score card forms the substance of Part II. The results of such measurement in four school systems—St. Paul, Omaha, Paterson, and Framingham—are given in part with the hope of showing school executives the advantages that may be gained from such a close scrutiny of the school plant.

Part III has been devoted to financial considerations involved in providing additional school accommodations in any city. Tabulations of per capita wealth, indebtedness, and expenditures on various bases have been presented which will furnish boards of education and school executive means for comparison of their own situation with that of cities of twenty-five to thirty thousand and over. It is hoped that the day will not be far distant when these tabulations are extended to all cities of five thousand and above, since it is frequently through such financial comparisons that taxpayers are influenced to make appropriations for educational development above what they had previously considered sufficient. Table LXXV may be utilized as a final means of measurement of what a community is able to do and has done in the way of appropriating money for educational needs.

Through the adoption of a program as above outlined, it is hoped the following may be among the aims secured. ✓

1. That boards of education and school superintendents may include in their building policy programs of modernization of old buildings, as well as a program of abandonment of old buildings which are no longer adequate in the light of present educational demands.

2. That boards of education may adopt minimum standards, above and beyond the requirements laid down by state departments, according to which future school buildings must be built. The adoption of such standards, and the exaction from architects of a close adherence to them, will eliminate many of the defects which can be found in buildings of even recent construction.

3. That communities which have adopted a building program over a period of years will not find it necessary to indulge in strenuous campaigns for building every time that a separate building unit must be built.

4. That land to be used ultimately for school sites will be purchased in advance of actual need in newly developing sections of

cities in such amounts that the children of the next generation will have adequate play and breathing space. Such land may be utilized for various purposes, such as school gardens, parks, and athletic fields, until it becomes necessary to build.

5. That such sites be chosen only after a most thorough study of population trend and future industrial and commercial developments.

6. That in the purchase of such lands rigid standards as to environment be considered and city ordinances passed insuring permanently a satisfactory environment for any school building built subsequently upon this land.

7. That communities will realize that efficient management of school business, as of any other business, includes the formulation of future educational policies. The adoption of an educational platform becomes necessary when the administration begins to think in terms of future building construction.

8. That in the development of school building programs no section of any community may receive consideration above and beyond that received by all sections.

9. That sections not adequately aroused to needs be influenced to think in terms of educational developments.

10. That educational financial needs may be properly emphasized when other demands are being made upon the public treasury.

11. That no community be permitted to lull itself into believing that only immediate needs require consideration. The issuance of long-time bonds will not be permitted where communities realize the burdens that the next generation must assume.

Finally, it is hoped that superintendents of schools may find within the program as outlined suggestions which will assist them in presenting their arguments for building extensions before boards of education and patrons who are not yet alive to the educational needs of their communities. If this volume becomes in this way of only slight assistance to superintendents of schools, the writer will feel that his work has been of some avail.

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